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MOOSE, the largest of the deer family now existing. It sometimes weighs as much as twelve hundred pounds and stands six feet in height. The antlers are flat and broad, with a number of prongs on each. The moose is a clumsy animal, but it is fleet of foot and is a dangerous foe when at bay. In winter the animals herd together, and in the summer they scatter and are found around lakes and streams.

Moosehead Lake, a lake in Maine, on the border of Somerset and Piscataquis counties. Its length is about 35 miles, its width from 1 to 10 miles. The Moose River and several other streams empty into the lake, while its outlets are the Kennebec River and the Penobscot River. The lake is navigable for steamboats. As fish are numerous, it is visited by many sportsmen.

Moosewood or Wic′opy. See Leatherwood.

Moradabad, *mo rud′ a bahd′.* See Muradabad.

Moraine, *mo rain′*, masses of rock and gravel carried and deposited by a glacier. As the glacier proceeds down its course these masses of rock and gravel accumulate until they form fairly regular walls. These walls constitute the *lateral* moraine of the glacier. When two or more glaciers flow in the same ravine, the moraines on the inner sides of these unite to form a *medial* moraine. As the glacier melts at its lower extremity, it deposits the rock and forms the *terminal* moraine. This continues to increase in size while the others continue to diminish. See Glaciers.

Moral′ity Play, a sort of allegorical play in which are embodied moral discourses in praise of virtue and in condemnation of vice, and in which the dialogue is carried on by personifications of virtues and in abstract qualities. The devil of the earlier Miracle Plays, which were never entirely superseded by the Moralities, became in general the Vice of the latter, although sometimes he appeared in person, with the Vice as his attendant. Moralities first appeared about the beginning of the reign of Henry VI and lingered until the reign of Elizabeth. Latterly they maintained their interest by reference to current topics, but finally gave way to regular drama.

Moral Philosophy. See Ethics.

Moran′, Thomas (1837–), an American illustrator and landscape painter, born in England. He came to the United States at an early age and settled in Philadelphia. He studied painting in water and oil in Europe and returned again to the United States. After visiting the Yellowstone, he painted *The Great Canyon of the Yellowstone* and *The Chasm of the Colorado,* which are now in the Capitol at Washington. The color effects of his works are excellent, and in this respect he resembles Turner, with whom he studied. Moran also made many designs for illustrations of books.

Mora′via, a northwestern province or crownland of Austria-Hungary, bounded by Austrian Silesia, Hungary, Lower Austria, Bohemia and Prussian Silesia. Its area is 8578 square miles. It consists of a plateau almost entirely bordered by mountains. The minerals are of considerable importance and include iron, coal, graphite and slate. The chief crops are rye, oats barley, potatoes, flax and sugar beets. Fruit is very abundant, and large quantities of wine are annually produced. Sheep and cattle are raised in large numbers. Moravia is the most important manufacturing province of the Empire, after Austria proper and Bohemia. Its woolen industries are of world-wide fame, and linen and cotton, beet sugar, iron and steel goods, machinery, beer and spirits are also produced in large quantities. The government of the province consists of a governor and a diet. The rule of Austria in Moravia began in 1526. About seventy per cent of the inhabitants of Moravia are Slavs, and almost all the remainder are Germans. Roman Catholicism is the prevailing religion. The capital and chief city is Brünn. Population, 2,437,706.

Moravian Brethren (also called United Brethren, Herrnhuter and, officially, Unitas Fratrum), a Protestant sect or church, which originally sprang up in Bohemia after the death of John Huss. They built the town of Herrnhut, in Saxony, still the headquarters of the Church. The doctrines of the Brethren had hitherto been more in harmony with the Calvinistic than with the Lutheran form of Protestantism, but under the influence of Count Zinzendorf, who himself became a bishop, they attached themselves to the Lutheran Church. From Herrnhut the Moravian Church extended to other points in Germany, and to England and the United States. The Moravian Brethren have always distinguished themselves as missionaries, and they maintain stations in North and Central America, South Africa, Australia and Tibet. They are noted for the simplicity of their life and manners and for their earnest, if somewhat narrow and austere, piety. Moravian schools deservedly enjoy a high reputation, even among those who are not members of the community. The Moravian Church is estimated to number about 115,000 adherents. In the United States there are 116 churches, with 16,327 communicants.

Mo′ray Firth or **Mur′ray Firth,** an arm of the North Sea which extends for about 40 miles into the northeastern part of Scotland. It is navigable for steamboats as far as Inverness.

Mor′dants, certain substances which dyers use for the purpose of fixing colors in fabrics. Among the mordants in common use are alum, several of the salts of iron, potassium, bichromate, tannic acid and the "fatty acids" in the form of soap.

More, HANNAH (1745–1833), an English writer, born at Stapleton, near Bristol. She was interested in literature from her childhood, but first turned her attention to it seriously after making the acquaintance of Doctor Johnson, Garrick and Burke. Her two tragedies, *Percy* and *The Fatal Falsehood,* were moderately successful, but she soon turned to the writing of moral and religious works, some of which were in her time exceedingly popular. *Coelebs in Search of a Wife* met with immense success, both in England and in the United States.

More, THOMAS, Sir (1478–1535), an English author and statesman, born in London. He was intended for the priesthood, but he turned to political life instead and entered Parliament in 1504. Through his opposition to the grants of certain moneys to Henry VII, he won the dislike of the king and soon left Parliament, but on Henry VIII's accession, he was given various honors and offices, and in 1517 he became a member of the king's council. This was very much in opposition to his own wishes, as he did not enjoy life at the court. When the Reformation began to be talked of in England, More supported Henry VIII in his defense of the Roman Catholic Church, and when Wolsey fell from power, the king made More his successor. Henry found, however, when he wished to divorce Catherine and to break with the Church of Rome, in consequence of its refusal to sanction the divorce, that More was by no means a tool in his hands. More resigned all of his offices, and when in 1534 he refused to take an oath which excluded Catherine's daughter from the throne and acknowledged Henry as head of the Church, he was imprisoned. The following year he was executed after a most unjust trial, and the consternation which reigned throughout Europe at his death shows that he was ranked in his own day, as he is in ours, as one of the noblest characters of history. More's chief literary work is his *Utopia,* written in Latin, which deals with the ideal conditions existing in an imaginary commonwealth located in the Atlantic.

More′a. See PELOPONNESUS.

Morelia, *mo ra′le ah,* or **Valladolid,** a town of Mexico, capital of the State of Michoacan, situated in a valley about 6300 feet above sea level. It is about 125 miles west-northwest of the city of Mexico. It has a mild and equable climate, is well built, has a cathedral, several fine churches and beautiful promenades. Cotton goods and tobacco are manufactured. Population in 1900, 37,278.

Mor′gan, DANIEL (1736–1802), an American soldier, born in Hunterdon County, N. J. He removed to Virginia in 1753, accompanied Braddock's expedition two years later and distinguished himself on the frontier. On the outbreak of the Revolution he went at the head of a company of Virginia soldiers to Boston in July, 1775. In the same year he accompanied Arnold's expedition to Quebec and took command of the force after Arnold was wounded. Though fighting his way into the very heart of the city, he was finally captured was later exchanged and became a colonel of a Virginia regiment, 1777, taking a prominent part in the Saratoga campaign. He later joined Washington in New Jersey, resigned because of his disgust at the management of the war, but fought under Gates in the Southern campaign. In command of the American forces at the Battle of the Cowpens, he won a memorable victory over Colonel Tarleton's cavalry. He was made a major general in the army during the Whisky Insurrection and represented Virginia in Congress in 1796.

Morgan, HENRY, Sir (1635–1688), a famous English buccaneer, born in Wales. He was kidnapped and sold into slavery in Barbados, when a child, and later he worked his way to Jamaica, where he participated in several buccaneering expeditions. In 1663 he was master of his own ship and soon acquired fame by his daring attacks upon West Indian and Central American towns. His most famous exploit was the sack of Maracaibo, where, after capturing the town, he led his men in the most terrible excesses. Being surprised by the arrival of three Spanish war ships, he suddenly attacked them, won a brilliant victory and escaped. He afterward figured in similar escapades in Panama, Cuba and other islands. He was once carried to England for trial, but was acquitted and afterward received knighthood. Returning to Jamaica, he was made lieutenant governor and at several different times was acting governor.

Morgan, John Hunt (1825–1864), an American soldier, born at Huntsville, Ala. He was taken in early childhood to Lexington, Ky., where he received an elementary education. In the Mexican War he was first lieutenant, but saw little active service. In 1861 he abandoned his business to join the Confederate service and was placed in command of a cavalry force, with which he did important service in Kentucky and Tennessee. His famous "Christmas Raid" into Kentucky in 1862 won for him promotion and a vote of thanks from the Confederate congress. In June, 1863, he set out to draw Rosecrans from his expedition into Tennessee. Morgan went farther than his orders, crossed the Ohio River and raided Indiana and Ohio towns. A rise in the river, however, prevented his return, and after losing 700 men he attempted to escape into Pennsylvania to join General Lee, but he was finally captured and imprisoned in the Ohio penitentiary. In November, however, he escaped, and later, in command of an independent force, he operated with the greatest success in Kentucky and Tennessee, but on September 4 he was betrayed and was shot while attempting to escape.

Morgan, John Pierpont (1837–   ), an American financier, born at Hartford, Conn., and educated at a high school in Boston and at the University of Göttingen, Germany. In 1857 he secured employment in a New York banking house, and in 1860 he became the American agent of George Peabody & Co., London brokers. Ten years later he became a partner of the Drexels, under the firm name of Drexel, Morgan & Co., which became the most important private banking house in America. In 1895 he was the leader of the syndicate which purchased $50,000,000 of the United States 4 per cent bonds; he has been the leading spirit in the consolidation of railways, and he holds a controlling interest in lines aggregating 50,000 miles in extent, besides owning ocean transportation lines and other large corporate interests. He liberally patronized art and contributed largely to charities. Perhaps his greatest achievement was the formation of the United States Steel Corporation.

Morgan, John Tyler (1824–1907), an American politician and lawyer, born at Athens, Tenn. When nine years of age he moved to Alabama, where, after an academic education, he was admitted to the bar in 1845. He served in the Confederate army, being promoted through all grades to brigadier general, and after the war he resumed his practice at Selma. He was elected to the United States Senate in 1877 and served continuously for thirty years. He served as one of the arbiters in the Bering Sea dispute of 1892 and was a member of the commission which organized the government in Hawaii in 1898.

JOHN PIERPONT MORGAN

Mor'ley, Henry (1822–1894), an English writer. He was educated at King's College, practiced medicine in Shropshire, taught school in Liverpool and in 1851 went to London as a journalist. From 1857 to 1865 he was English lecturer at King's College, and later he was professor of English language and literature at University College, London, and at Queen's College. In 1882 he became principal of University Hall. His more important works are connected with the history of English literature and include *A First Sketch of English Literature* *and English Writers*, and *English Literature in the Reign of Queen Victoria*. He edited various series of literary works, besides writing many biographies.

Morley, John (1838–), an English author and statesman, born at Blackburn, Lancashire, and educated at Lincoln College, Oxford. He studied law and was called to the bar, but soon turned his attention to literature. For some time he was editor of the *Literary Gazette*, and he afterward conducted the *Fortnightly Review*, the *Pall-Mall Gazette* and *Macmillan's Magazine*. His first work in book form was his *Life of Edmund Burke*, and this was followed by a *Life of Richard Cobden*. He was elected to Parliament in 1883 and some years later was made secretary of state for Ireland. Among his other works are *Voltaire*; *Rousseau*; *Diderot and the Encyclopaedists*; *Oliver Cromwell*, and a *Life of Gladstone*, which is regarded as the standard biography of Gladstone. Morley also edited the English Men of Letters Series. In 1905 he became secretary of state for India in the Campbell-Bannerman Liberal ministry.

Mor'mons or **Church of Jesus Christ of Latter Day Saints**, a religious organization founded by Joseph Smith, of Sharon, Vt., in 1827. Seven years previously, when he was only fifteen years old, the first two persons of the Trinity had, he claimed, visited him. The visit was repeated in 1823 and again in 1827, on which occasion there were delivered into his hands the golden plates of "The Book of Mormon." The plates were nearly eight inches long by seven inches wide, a little thinner than ordinary tin and bound together by three golden rings. The entire volume was about six inches thick, a part being sealed, and only that part which was unsealed was revealed to him, the other part being reserved for some future time. The letters, characters or whatever they might be called, were of very small size and beautifully engraved. They were in a language unknown to moderns, but called by Smith the "Reformed Egyptian." Accompanying the plates were the Urim and Thummim of Scripture, by means of which Smith claimed to have translated the records thus miraculously discovered. Oliver Cowdery, a youthful associate of Smith's, took down the words as Smith read them to him from the plates, and the first edition of the *Book of Mormon* was issued at Palmyra, N. Y., in 1830. Oliver Cowdery, David Whitmer and Martin Harris united in an affidavit, which prefaced the work, that they had been shown, by an angel who came down from heaven, the plates from which the book had been translated, and this testimony was supplemented by that of eight other witnesses, including the father and two brothers of Joseph Smith, all of whom claimed to have seen the original plates. No one else was permitted to see them before they were returned to the angel from whom Smith received them. A farmer named Harris having supplied the necessary funds, the book was published, and the new sect of Mormons sprang into active existence and was the means of making multitudes of zealous converts.

The new sect met persecution from the start. Smith organized a church in Palmyra, Wayne Co., N. Y., April 6, 1830, and then, guided by a revelation, removed to Kirtland, Ohio, in 1831, where a bank was started, with Smith as president. In the same year a colony was founded in Missouri. Despite popular opposition, converts gathered in large numbers from different states, and in 1833 the new church was formally organized under the presidency of Smith, Rigdon and F. C. Williams; and Brigham Young, a young Vermont painter of ability and originality, was appointed missionary, or evangelist. In 1835 twelve apostles, including Young, were chosen, and soon after, a council of seventy. In 1837 Orson Hyde and Heber C. Kimball were sent as missionaries to England, where in eight months they converted and baptized 2000 people. In 1838 the Kirtland bank failed, and Smith, accompanied by Rigdon, fled to a settlement of the sect that had been started at Independence, Mo. Here serious trouble broke out, and the denomination, to the number of 15,000, removed to the east bank of the Mississippi River, in Hancock Co., Ill., and established a new city, which they called Nauvoo. For a time the city flourished surprisingly, but it was not long before new troubles arose. The *Book of Mormon*, Lamoni Edition, contains a strong denunciation of polygamy, but under what was claimed to be a new revelation the practice was instituted at Nauvoo, where it aroused popular indignation. This, with minor troubles, occasioned what was known as the "Mormon War." Joseph and Hyrum Smith, having been arrested for violations of law, were placed in jail in Carthage, where, on the 27th of June, 1844, they were shot to death by a mob. The troops of the state were called out to quell the disturbance, and the Mormons, under a fresh revelation claimed to have been received by their new leader, Brigham Young, emigrated in a body to Salt Lake City, Utah, in 1847, where they have since flourished undisturbed. Brigham Young was governor of Utah from 1851 to 1858. Under a law passed by Congress in 1882, since materially amended, polygamy has been abolished within the limits of Utah; and since the admission of the territory into the Union as a state, the practice has practically disappeared. It was never approved by a large number of Smith's followers. The Mormon Church claims 300,000 communicants in the United States and foreign fields. A body in Iowa and Illinois, under the lead of Joseph Smith, a son of the founder, calling itself the Reorganized Church of Latter Day Saints, numbers 43,250.

Morn′ing-Glory, the common name of a number of plants of the convolvulus family, all having handsome purple, white, pink or pale blue funnel-shaped flowers, which open for a short time in the morning and close during the day. The morning-glory was long a favorite plant in country gardens, and in some regions it has run wild and become a weed. See Bindweed.

Moroc′co or **Marocco,** a sultanate occupying the northwest extremity of Africa, bounded by the Atlantic Ocean, the Mediterranean, Algeria and the desert. Its area is about 300,000 sq. mi. Its most remarkable natural feature is the Atlas Mountains, the great chain or series of chains extending through it from northeast to southwest, reaching a height of 12,000 to 13,000 feet. Between the mountains and the sea are tablelands and plains, some of them of great fertility. The climate in many parts is pleasant and temperate; in others the summer heat is intense. All parts of the country, however, are healthful. The minerals include copper, iron and antimony, and probably gold and silver. The flora includes the cork oak, the cedar, the Aleppo pine, the date palm and the dwarf palm. Agriculture is in the lowest possible condition, and the annual production is barely enough to supply the wants of the country. The cereal crops include wheat, barley and maize; but millet constitutes the chief support of the population. All the fruits of the south of Europe are cultivated to some extent. Among the wild animals are the panther, the jackal, the hyena, the wild boar, the gazelle and several species of large antelope. Cattle and sheep are reared, and the spirited small horses for which the country was once famous are still numerous. There are large numbers of goats, which furnish a principal article of export—the well-known Morocco leather. In general, among the rural population, each family supplies all its own wants. In the towns, however, some manufactures have sprung up. Fez makes the cloth caps which bear its name—many of which, however, are imported from Austria; and carpets, embroidered stuffs, pottery and arms are also made. The trade is carried on by caravan with the interior or by sea with European states.

The Berbers are the oldest inhabitants and are still the most numerous. The Arabs form the bulk of the rural population in the plains; some of them cultivate the soil, and others are Bedouins. In the towns along the coast are found the Moors, and a considerable number of Jews inhabit all the commercial towns. The civilization of Morocco has sunk to a low condition. The sovereign, or sultan, is absolute in the strictest sense. The imperial revenues are derived from arbitrary imposts on property, duties on imports and exports, monopolies and fines and confiscations. The chief towns are Morocco, Fez, Mekinez and Tangier.

Morocco in ancient times formed part of Mauretania, and about 43 A. D. it was incorporated in the Roman Empire. In the latter part of the seventh century the Arabs spread over North Africa and took possession of the territory. The chief dynasties in the centuries that followed were the Almoravides and the Almohades. When the Moors were driven out of Spain, after the fall of Granada in 1492, many of them settled in Morocco. In 1814 the slavery of Christians was abolished, and piracy was prohibited in 1817. The conquest of Algeria brought about complications with France, and the plundering of vessels by pirates has often caused trouble with European powers. In 1859 a war broke out with Spain, owing to attacks made by some of the wild tribes upon Spanish territory, and it resulted in a cession of land and the payment of an indemnity of $20,000,000 to Spain. The population of Morocco is estimated at about 5,000,000.

Morocco, one of the capitals of the sultanate of Morocco, situated in the southwest part of the country, on an extensive and fertile plain about 1500 feet above sea level. It is nearly 6 miles in circumference and is walled, though its walls and towers are in a dilapidated condition. The streets are unpaved, dirty, narrow and irregular, and the houses are small and mean. There are several open areas, used as market places, a covered bazaar and many mosques. Near the palace, which is in the south part of the city, is the Jews' quarter, a walled enclosure about 1½ miles in circumference. There are several tanning and leather-dyeing establishments, but the manufacture of Morocco leather is not as important as it was formerly. During the Middle Ages the city was one of the chief centers of Mohammedan rule and was famous as a seat of learning, but its former splendor is destroyed. Population, estimated at about 50,000.

Morocco, a fine kind of leather, made from the skins of goats, imported from the Levant, Barbary, Spain, Belgium and other countries. It is tanned with sumach, dyed and grained, the last process being that which gives it its well-known appearance. Morocco is extensively used in binding books, upholstering furniture and making ladies' shoes. Imitation moroccos are made from sheepskins. They are so perfect in appearance that it is difficult to distinguish them; but they are entirely lacking in the durability of the real article. The art of preparing morocco is said to have been derived from the Moors; hence the name. See Leather.

Morpheus, *mor'fuse,* in classical mythology, the god of sleep, twin brother of Mors, death.

Morphine, *mor' fin* or *mor' feen,* or **Morphia,** the bitter narcotic principle of opium, first separated from it in 1816. Morphine forms, when crystallized from alcohol, brilliant colorless prisms. As it is very slightly soluble in water, it is never used alone medicinally, but it readily combines with acids, forming salts extensively used in medicine. In small doses it relieves pain; in large doses it causes death, with narcotic symptoms. It is very commonly administered medicinally by hypodermic injection. The habitual use of the drug is exceedingly injurious, and the "morphine fiend" becomes a perfect slave to his appetite. Those addicted to the use take large doses, many times larger than that which would kill any one who was not inured to the drug. They lose color and flesh, become weak and suffer terrible pains; their memories fail, they lose their moral sense, especially their regard for truth, and become helpless incurables.

Morphology, *mor fol' o jy,* the science of form; a branch of zoölogy and botany which deals with the forms of animals and plants and with the forms of their different organs. It is by the study of morphology that the material is obtained for all true systems of classification and arrangement.

Mor'rill, Justin Smith (1810–1898), an American political leader, born at Strafford, Vt. He was educated in the common schools and engaged in business, but soon entered politics and in 1854 was elected to the national House of Representatives. He was reëlected five times and in 1867 entered the United States Senate, where he remained until his death. His combined service was the longest Congressional career in American history. He was always a leader and served on the most important committees. In 1857 he introduced a bill granting public lands for the founding of state colleges to teach agriculture, mechanic arts and allied subjects. It was first vetoed, but was again passed in 1861 and was signed by President Lincoln. An additional grant was made by an act introduced by Senator Morrill in 1890 (See Agricultural College). He is perhaps chiefly remembered, however, as the author of the Tariff Act of 1861, which was the beginning of the present system of high tariff. He was a conspicuous opponent of territorial expansion and of the increase of paper currency.

Mor'ris, Clara (1846?–   ), an American actress, born in Toronto, Canada. Her stage career began as a member of a ballet and later as leading actress at the Academy, in Cleveland, Ohio. Her success in *Camille, Miss Multon* and other plays brought her before the public as one of the foremost actresses of the day. In 1874 she married F. C. Harriott. After 1885 she acted little and spent much of her time in writing. Among her works are *Little Jim Crow* and other stories of children, *Life on the Stage, Stage Confidences* and a novel, *The Pasteboard Crown.* In 1904 Clara Morris appeared in an all-star cast of *The Two Orphans.*

Morris, Gouverneur (1752–1816), an American statesman and diplomat, born at Morrisania, N. Y. He was educated at King's College (now Columbia) and was admitted to the bar in 1771. Four years later he entered the provincial congress of New York. From 1777 to 1780 he was a member of the Continental Congress, and in 1781 he was appointed assistant superintendent of finance under Robert Morris. As a delegate to the Constitutional Convention in 1787 he acted with the strong government party and was largely responsible for the literary form of the Constitution. He represented the United States as minister to France and to England and from 1800 to 1803 was United States senator for New York.

Consult Roosevelt's *Gouverneur Morris*, in the American Statesmen Series.

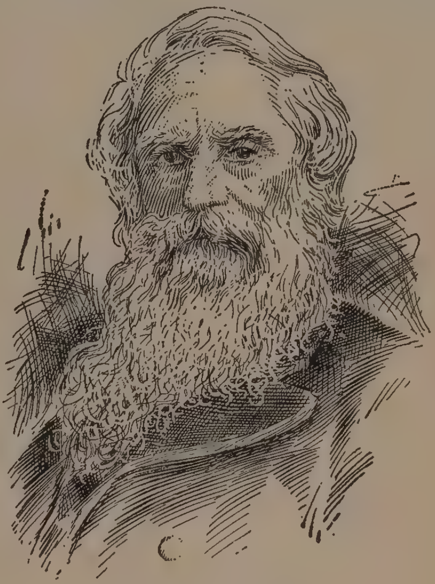
Morris, Robert (1734–1806), a signer of the Declaration of Independence, born in England. In 1775 he was delegate to the Continental Congress and was a warm supporter of the Revolution. He gave large sums from his private fortune to the government, and he also endorsed many of its notes. As superintendent of finance, in 1781 he organized the Bank of North America, which was of great assistance to the government in the next few years. In 1787 he was a member of the convention that framed the United States Constitution, and afterwards he was a member of the United States Senate.

Mor'rison, William Ralls (1824–), an American lawyer and politician, born in Monroe County, Ill. He was educated in McKendree College, served in the Mexican War, was admitted to the Illinois bar and was elected to the legislature in 1855. He served in the Civil War from 1861 to 1863 as colonel of an Illinois regiment, was elected to Congress in the latter year, served one term and again from 1873 to 1887. During his term in Congress he was a member of important committees and was the author of the Morrison tariff bill, which was defeated in 1886. In 1887 he was appointed to the newly-created Interstate Commerce Commission, where he served ten years, for a part of the time as chairman.

Mor'ristown, N. J., the county-seat of Morris co., 18 mi. w. of Newark, on the Lackawanna, the Morristown & Erie and other railroads. During the Revolution Washington had his headquarters here for a time in the old Ford mansion, which now belongs to the Washington Society and contains numerous relics. Samuel F. B. Morse and Alfred Vail here perfected the electric telegraph. Four miles from the city is the state hospital for the insane, and other features of interest are the Memorial and All Souls' hospitals, the Y. M. C. A. building, the public library and the lyceum. The place was settled in 1710 as West Hanover, and in 1740 it received its present name. Population in 1905, 12,146.

Morse, Samuel Finley Breese (1791–1872), the inventor of the electric telegraph. He was born at Charleston, Mass., and was educated at Yale College, where he devoted his time to chemistry and natural philosophy. After his graduation from Yale, he went to England and studied painting under West, and his first model of *The Dying Hercules* received the gold medal of the Royal Academy On his return to the United States he continued painting and in 1826 founded the National Academy of Design, of which he was the first president. He revisited Europe and spent three years in the leading cities of the continent, studying art.

In 1826 he became greatly interested in electro-magnetism and after this spent a great deal of his time in studying this subject. On a voyage from Europe he worked out a plan for using electro-magnetism in telegraphy. In 1835 he showed the success of his apparatus through a half-mile of wire which he had strung around his room. Two years later he gave a public exhibition of the telegraph, and this is the date generally given for his invention. On his appeal to Congress for aid in developing the system, he was refused, and Morse returned to Europe, where he tried to secure assistance, but failed. The next four years he spent in the United States, attempting to influence Congress to grant him the necessary appropriation for an experimental telegraph line. He was finally successful and received $30,000 for the construction of the desired line from Washington to Baltimore. This was finished in 1844 and was completely successful. The system soon spread over the United States and also was adopted all over Europe. Alfred Vail, a partner of Morse, did much by his skill and knowledge



SAMUEL F. B. MORSE

in perfecting the instruments Morse had invented. In the opinion of some, Mr. Vail was the real inventor of the telegraph, but in a controversy between Morse and Vail concerning some patents, Morse's claims were sustained in the final decision. The actual facts are that Vail did not change the plan which Morse perfected, but that he simply improved the mechanical construction of the instruments.

Morse also, in addition to the invention of the telegraph, laid the first submarine telegraph across the bay in New York. He also took the first daguerreotypes ever made in America. He received distinguished honors from all countries and was elected to the membership of numerous scientific and learned societies. In 1857 the representatives of ten countries voted him $80,000 as a reward for his labor. In 1871 a bronze statue was erected in his honor in Central Park, New York. See TELEGRAPH.

Mortal'ity, LAW OF, the statement of the average number of persons who die in any assigned period of life, out of a given number who enter upon the same period. Tables and statistics upon which the law is founded are called *tables of mortality.* Such a table (for the United States) follows, the number of individuals of each class considered being one hundred:

AGE	DEATH RATE	
	OF MALES	OF FEMALES
0 to 4	56.7	47.5
5 to 14	4.4	4.2
15 to 24	6.7	6.1
25 to 34	9.5	8.5
35 to 44	12.4	10.5
45 to 64	24.1	20.1

The average age of Americans at death in 1890 was 31.1 years; in 1900, it was 35.2. The average annual death rate per thousand in 1900 was 17.8; only two countries of the world showed a lower rate.

Mortar, *mor' tur,* a vessel in which substances are pounded to a powder by means of a pestle. Mortars are made of wood, stone, iron, glass or porcelain. Those made of wood and stone were the first mills used for grinding corn. In colonial times, the small wooden mortar was a common household utensil and was used for grinding coffee and the seeds that took the place of spices. Small glass and porcelain mortars are used in chemical laboratories and by druggists in compounding medicines.

Mortgage, *mor' gaje,* in law, the conveyance of an estate, real or personal, by a debtor to his creditor, as a pledge of security for a debt. The debtor is called the *mortgagor,* the creditor, the *mortgagee.* The conveyance is absolute in form, but it is subject to a proviso, by which it is to become void, or by which the pledge is to be reconveyed, upon repayment to the mortgagee of the principal sum secured, with interest, on a certain fixed day. Upon the nonperformance of this condition, the mortgagee gains absolute ownership at law, but the property remains redeemable in equity during a limited period. In order to obtain absolute possession, the mortgagee has to file a bill of foreclosure against the mortgagor, calling upon the latter to redeem his estate forthwith, by payment of the principal money, interest and costs; and if the mortgagor fail to do so within the time specified by the court, he is forever barred from doing so, to satisfy a debt, and the mortgagee becomes owner in equity, as he before was in law. In the event of a sale, any surplus must be paid to the mortgagor. If personal property, or *chattels,* are pledged as security, the mortgage is known as a *chattel mortgage* (See CHATTEL).

Mor'ton, JULIUS STERLING (1832–1902), an American politician, born in Adams, Jefferson County, N. Y. He was taken in infancy to Michigan, studied at the state university and completed his educaton at Union College in 1854. In the following year he went to Nebraska, where he established the first newspaper in the state, the *Nebraska City News.* He was elected to the territorial legislature and was for a time acting governor. As the Democratic candidate, he was defeated in the election of 1866. In 1881 he was again an unsuccessful candidate for governor; in 1893 he became secretary of agriculture in President Cleveland's cabinet. He was a lover of nature, a great student of forestry and was responsible for the establishment of Arbor Day in Nebraska, a holiday devoted to the planting of trees, which has been adopted by many other states (See ARBOR DAY). He was an active member of the gold, or conservative, faction of the Democratic party, and at the time of his death he was editing a weekly paper called the *Conservative.*

Morton, LEVI PARSONS (1824–), an American financier and politician, born at Shoreham, Vt. He graduated at Shoreham Academy and immediately entered upon a mercantile career, founding the banking houses of L. P. Morton & Co. and Morton, Bliss & Co., of New York, with branches and affiliated firms in London. In 1879 he was chosen to Congress from New York, two years later was United States minister to France and in 1889 was elected vice-president of the United States on the Republican ticket with Benjamin Harrison. In 1895 he was elected governor of New York and served one term.

Morton, Oliver Perry (1823–1877), an American politician, known as the "war governor" of Indiana. He was born in Wayne County, Ind., was educated at Miami University, studied law and began its practice in 1847. He soon attained eminence in his profession and entered politics as a Democrat, but because of his opposition to the Kansas-Nebraska Bill, he helped to form the Republican party and was its first candidate for governor in Indiana, but was defeated. He was elected lieutenant governor in 1860 and succeeded to the governorship the following year. Throughout the war he was a strong adherent of the Union cause and did his utmost to spread a loyal sentiment throughout his state, though encountering the greatest difficulties. He succeeded in putting down the disloyal associations and was reëlected in 1864. Three years later he entered the United States Senate and was reëlected in 1873. There he became a recognized leader of his party, served on many important committees and was a close friend and adviser of President Grant. Three years later he was a prominent candidate for the Republican nomination for president and in the same year served on the electoral commission.

Morton, Paul (1857–), an American financier and politician, the son of J. Sterling Morton, born at Detroit, Mich. He entered the service of the Burlington railroad in 1872 and was promoted through various positions to be general freight agent of the system. He also became interested in coal mines and was second vice-president of the Atchison, Topeka & Santa Fé railway from 1898 to 1904. In that year he was appointed secretary of the navy; but he resigned at the end of one year to accept an election as chairman of the reorganized board of directors of the Equitable Life Assurance Society of the United States.

Morton, William James (1845–), a son of William T. G. Morton and a prominent physician and student of nervous diseases. His contributions to medical literature have been largely in the explanation of his discoveries in the region of electro-therapeutics. He was a pioneer in the use of X-rays, and he himself was the inventor of a method for creating electric currents of a new variety.

Morton, William Thomas Green (1819–1868), an American dentist, famous as being the first to use ether as an anesthetic. He was a brilliant man who invented many dental methods, and, after using ether in a number of minor operations and in many experiments on animals, he made its value known to the public. Dr. C. T. Jackson in England laid claim to the same discovery at about the same time, and Morton was never able to establish fully his claim to priority in his discovery of the anesthetic or his right to receive compensation from the government and individuals for its use, although he involved himself in many legal controversies to secure his fancied right.

Mosaic, *mo za' ik*, a branch of the fine arts by which ornamental patterns and elaborate pictures are made up of small pieces of marble, glass or other substances in different colors, set closely together. It originated in the East and was thence brought to the Greeks and Romans, but did not become especially prominent until the Middle Ages. The Romans practiced it in the decoration of their floors, which were commonly in mosaic of white or light gray marble cubes, about an inch square. Fragments of their pavements have been preserved and exhibit a great variety of design and richness of color. For instance, in the Capitoline Museum at Rome is a mosaic of wonderful workmanship, representing four very lifelike doves, drinking from a basin of water. In the Museum of the Lateran are coarser mosaics, which were taken from the Baths of Caracalla. During the early part of the Middle Ages the Christian churches were adorned with most splendid and expensive designs. Saint Paul's at Rome is decorated with portraits of all the popes, in mosaic manufactured at the celebrated studio in the Vatican. The mosaics in Saint Peter's, Rome, and Saint Mark's, Venice, also are especially beautiful and consist of small pieces arranged so accurately that the general effect is that of a painting. Remarkable imitations of the works of the great master painters have been executed in mosaic. Mosaic work has been used in the decoration of tables and other articles of furniture, and in some of the great museums are pieces so marvelously made that the joints cannot be seen.

In what is known as the *Florentine mosaic*, slabs of white or black marble for tables and other articles are inlaid or veneered with hard stones. Leaves, petals, stems and other parts of flowers may be cut out of stone of the proper color and shading, and set into the groundwork. A beautiful effect is produced by having some parts in relief; for instance, a cherry will be represented by a brilliant red stone raised above the general surface.

Mosby, *moz'by,* John Singleton (1833–), an American lawyer and soldier, born in Powhatan County Va. He was educated at the University of Virginia, was admitted to the bar in 1855 and began practice at Bristol. He served in the Confederate army, and as commander of the famous "Mosby's partisan rangers" did much damage to the Union armies and caused anxiety in northern cities. After the war he practiced law in Virginia, became a Republican and was made United States consul at Hong Kong, in 1878. Upon his return, seven years later, he began the practice of law in San Francisco.

Moscow, *mos'ko,* the second capital of the Russian Empire, the chief town and the capital of the government of the same name, situated in a highly cultivated district on the Moskva, 400 mi. s. e. of Saint Petersburg. It is the city where the czars are crowned, and with it are connected many of the most sacred traditions of the Russian people. The Kremlin, which faces the center of the city, is the most sacred spot in Russia (See Kremlin). To the east of the Kremlin is the portion of the city known as the Kitai Gorod (Chinatown), which still forms the commercial center of Moscow. This is separated from the rest of the city by an ancient turreted wall. About the Kremlin and the Kitai Gorod extends the so-called White Town (Byely Gorod), the most elegant portion of the city, and beyond the White City in a broad zone is the section known as the Earthen Town (Zemlyanoi). Outside of all of these quarters are the suburbs, which are larger than all of the rest of the city combined.

Among the chief buildings outside the Kremlin are the Cathedral of Saint Basil, the most striking building of Moscow, built in the sixteenth century; the modern Church of the Savior; the palace which Napoleon occupied while in Moscow, and the townha The principal educational establishment is the Imperial University, founded in 1755 by the empress Catharine. It has over four thousand students, a rich museum and a library of 300,000 volumes. Moscow is the first manufacturing city in the Empire, and of late years its industrial and commercial activity has greatly increased. The principal manufactures are textile fabrics, woolen, cotton and silk; but hats, hardware, machinery, leather, chemical products and spirits are also produced in large quantities. On account of its position, Moscow is the great center for the internal commerce of the Empire, and it is in fact one of the chief commercial centers of Europe.

The foundation of Moscow dates from the twelfth century, although the site was probably occupied long before. It became the capital of Muscovy and afterward of the whole Russian Empire, but was deprived of this honor in 1703, when Saint Petersburg was founded. The principal event in the history of the city is its occupation by Napoleon in 1812 and the burning of the city for the purpose of dislodging the French from their winter quarters. In 1896, during a festival in honor of the coronation of Nicholas II, the crowd in Moscow was so great and excitement rose so high that over two thousand people were crushed to death. Population of the city in 1902, not including the suburbs, 1,092,369.

Moscow, Idaho, the county-seat of Latah co., about 80 mi. s. by e. of Spokane, Wash., on the Northern Pacific railroad and the line of the Oregon Railroad and Navigation Company. The University of Idaho and the State Agricultural College are located here. The principal industries of the surrounding region are mining, lumbering, farming, fruit growing and stock raising. There are tile and brick works, a flour mill, lumber yards and a number of grain elevators. Population in 1900, 2484; estimated in 1905, 5200.

Moselle, *mo zel',* a river which rises in France in the Department of Vosges, flows northwest, then north, finally northeast, and after a winding course empties into the Rhine, at Coblenz. Its total length is about 320 miles, over 200 of which are navigable. The wines of the Moselle basin are famous for their delicate aroma.

Moses, *mo'zes,* leader, prophet and legislator of the Israelites, born in Egypt about 1600 B. C., during the time of the oppression of the Hebrews. His father, Amram, and his mother, Jochebed, both of the race of Levi, were obliged, in obedience to a royal edict, to cast him into the Nile, but placed him in a basket of bulrushes on the river border, where he was found by the daughter of the Egyptian king as she went to bathe. She adopted him as her son, and in all probability she had him educated for the duties of the priesthood. The promises of God that his race would become a great nation occupied much of his thoughts, and at last, according to the Scriptures, God appointed him the chosen deliverer from the bondage in Egypt. Being slow of speech and possessing none of the arts of an orator, God gave him power to prove his mission by miracles and joined to him his elder brother Aaron, a man of little energy but of considerable eloquence. Thus prepared, Moses returned to Egypt at the age of eighty years to undertake the work. At first he had the greatest obstacles to overcome, but after the visitation of ten destructive plagues upon the land, Pharaoh suffered the Hebrews to depart. Moses conveyed them safely through the Red Sea, in which Pharaoh, who pursued them, was drowned with his army. New difficulties arose, however. The distress of the people in the desert, the conflicts with hostile races and the jealousies of the elders often endangered his authority and even his life, despite the miraculous attestations of his mission. During the term of the encampment at Sinai, he received the Ten Commandments and the laws for the regulation of the lives of the Israelites. When they were already near the end of their journey toward Canaan, Moses saw himself compelled, in consequence of new evidences of discontent, to lead them back to the desert for forty years more of toilsome wandering. On account of a murmur which, in the midst of his distresses, he allowed to escape against his God, Moses was not himself permitted to see the Israelites settled in their new country. After appointing Joshua to be the leader of the Hebrews, he ascended a mountain beyond Jordan, from which he surveyed the land of promise, and there he died in his 120th year.

Mosque, *mosk*, a Mohammedan church, or house of prayer, constructed in the Saracenic style of architecture and often noted for the extent and the grandeur and height of the cupolas or domes. A mosque contains neither altars, paintings nor images, but it has a great quantity of lamps of various kinds, arabesques, which form the principal interior ornament, and sentences from the *Koran* written on the walls. The early mosques which remain to us are the Mosque of Damascus, the Al-Aksa Mosque and the Dome of the Rock, commonly called Mosque of Omar. The Al-Aksa resembled a hall or a Christian church. Another important building is the great mosque at Cordova in Spain, founded in 786. The main hall was the largest known, measuring 534 by 387 feet and 30 feet in height. There were 856 columns in 19 aisles. The most perfect mosque was built by Ibn Tulun, in 876 A. D. This building is nearly square (390 feet by 455), with a central court, around which on three sides are two ranges of arcades, while on the side toward Mecca there are five. It is built of brick covered with stucco. The mosque and tomb of Kaid Bey, erected in 1463 outside Cairo, is one of the most graceful specimens of Mohammedan architecture. The splendid mosque of Mesjid Shah was built during the dynasty of the Sufis by Shah Abbas (1585–1629), in his capital of Ispahan, Persia. It is 223 feet by 130, and the center compartment is surmounted by a double dome, whose external height is 165 feet. See SOPHIA, CHURCH OF SAINT.

Mosquito, *mos ke'to*, a well-known insect of the gnat family that makes itself a pest by its severe bites. Mosquitoes are constant inhabitants of the warm regions, and during the summer they penetrate even to the arctic regions. In the United States there are about twenty-four species, all belonging to the same family.

The common mosquito may be taken as a type of the entire family. The female pierces the skin and sucks the blood of living animals. The proboscis or beak is needle shaped, slightly enlarged at the end and covered with minute projections, that give it, when magnified, the appearance of a coarse, round file. It is particularly fitted for an instrument of torture and is the principal cause of the irritation that arises from the bites. The proboscis of the male is too weak to pierce the skins of animals, and it feeds on the juices of plants.

The eggs of the mosquito are laid in stagnant fresh water and appear in boat-shaped masses floating on the surface. Each mass is about a quarter of an inch in length and contains from 200 to 400 eggs, set on end in a single layer. In warm weather the eggs hatch in about 16 hours, the larvae appearing as *wrigglers*. The larvae live in the water, are very active and feed upon minute aquatic organisms. They change to the pupa stage in about seven days under favorable conditions. The pupae float upon the surface and mature in two or three days, when the imago, or perfect insect, appears. The life-history of the mosquito during the summer is completed within a period varying from 11 to 14 days, and the insects multiply very fast. During cool weather the period of transition is much longer, and many of the larvae remain torpid through the winter, to become perfect insects the next season.

TRANSMISSION OF DISEASE BY MOSQUITOES. The common mosquito in the United States, and in temperate latitudes generally, does not transmit disease, but in tropical climates its bite is known to cause elephantiasis. Another species, the *Anopheles*, transmits malaria, and a third, the *Stegomya*, propagates yellow fever.

All diseases communicated by mosquitoes are caused by germs (See GERM THEORY OF DISEASE). Elephantiasis is caused by a small, thread-like worm (*Filaria*), which lives in the lymphatic vessels of the skin. Its presence causes the skin to become thickened, rough, warty, livid in color and insensible to feeling. The worms multiply and pass from the lymphatics into the blood of the infected individual, where they are found in abundance at night, when the patient is asleep. During the day, however, they do not exist in the blood. The young worms are sucked with the blood of the infected person into the stomach of the mosquito. They remain in the stomach about 17 days, then penetrate the proboscis. When the infected mosquito bites its next victim the worms escape into the lymphatic vessels of the skin, and there they grow to maturity, multiply and produce elephantiasis.

The malaria mosquito can be easily distinguished from the common species by the spots on its wings. The parasite causing malaria is a minute protozoan, or animalcule, consisting of only one cell and known as *Hoemamoeba*. This parasite infests the red corpuscles of the blood, grows until it occupies the entire corpuscle, then divides into numerous spores, which escape into the liquid plasma of the blood and in turn infest other corpuscles. The spores are liberated from all the corpuscles at the same time, and the liberation produces a paroxysm of chills and fever. There are different varieties of parasites, each having its time for dividing into spores. One variety produces the second brood of spores the second day after the first, so that the malarial paroxysms occur every third day; another produces its second brood in three days and occasions a paroxysm every fourth day, while still another variety causes daily paroxysms. The presence of the malarial parasite in the blood causes the destruction of red corpuscles in large numbers. Standard authorities estimate that a patient of vigorous constitution during the first four days of daily intermittent fever loses 2,000,000 corpuscles per cubic millimeter of blood, and in certain cases the loss of 1,000,000 corpuscles has been verified at the end of 24 hours. In cases having a duration of 20 or 30 days, the number of red corpuscles may be reduced from 5,000,000, the normal number per cubic millimeter, to 1,000,000, or even less. Quinine kills the spores, so it is an effective remedy. To secure the best results it should be taken when the paroxysm begins.

The *Stegomya*, or yellow fever mosquito, is found only in the warm regions. It resembles the common mosquito very closely, but it may be distinguished from it by the silver stripes on the thorax and the abdomen. While the nature of the yellow fever germ is not yet understood, experiments in Cuba in 1900, under the direction of Dr. Sternberg, surgeon-general of the United States army, seem to show conclusively that the disease is communicated by mosquitoes. The commission conducting the experiments constructed two rooms for the purpose. One was furnished with beds and bedding which had been used by yellow fever patients. The bedding was not disinfected or even washed. The room was not ventilated, nor open to the sunlight, but it was protected from mosquitoes. Seven non-immune people occupied this room for several days, sleeping in the infected bedding and in some cases wearing the clothing of the yellow fever patients. None of them took the disease. The other room was arranged after the best hygienic plans and was occupied by seven other non-immune persons. Mosquitoes known to have bitten yellow fever patients were placed in this room, and six of the seven people came down with yellow fever. The conclusions of the commission are that yellow fever is not a contagious disease, like smallpox or scarlet fever, but that it is communicated by these mosquitoes and by them only. The results of these investigations point to the necessity of destroying mosquitoes, if the spread of the diseases described is to be prevented.

Mosquito Territory or **Mosquito Reserve,** a region of Central America, lying on the Caribbean Sea and forming the eastern seaboard of Nicaragua. It has a fertile soil and produces mahogany and other cabinet timber, dyewoods and drugs. It is inhabited chiefly by the Mosquito indians. For a considerable period it was governed by a native chief and was under British protection, but in 1860 it was made over to the State of Nicaragua. The chief town is Bluefields.

Moss′bunker. See MENHADEN.

Mosses, small, leafy-stemmed plants of the order of bryophytes. They often form large and very pretty mats of living green in moist and shady woods. Some species grow on trees and stones, and some live on dry soil. They produce no flowers, but they bear spores in cup-like receptacles, that, when ripe, open and discharge their contents. When these spores fall upon the ground, they develop round, slender, thread-like bodies, upon which, in time, little buds appear, and from these buds grow the familiar moss plant, which again produces organs from which spores are formed. Mosses are very hardy plants and have great power of multiplication, young shoots often springing from old ones which have apparently ceased to live. Mosses can grow where nothing else but lichens can exist, and by their vigorous growth the mosses furnish soil for higher plants. Besides this, they help the higher plants by protecting their roots from cold and by filling up swampy places, which in time make good soil. The sphagnum mosses grow in bogs and wet places. While a portion of the stem dies each year, the tip continues to grow higher, and by this process dense beds many feet thick are formed. In time the stems in the lower levels become peat. Some mosses furnish medicines, and others are used as food, while a great many are suitable for bedding and for packing things easily broken.

Most, JOHANN JOSEPH (1846–1906), a German-American anarchist, born at Augsburg, Bavaria. He was first a bookbinder, later wrote for magazines as a socialist, but was finally converted to the anarchist doctrine and was expelled from the socialist organization. He founded *Die Freiheit* in London, which became the organ of anarchism in Europe. In 1882, after suffering long imprisonment for violent editorials, he removed to New York, where he resumed the publication of *Die Freiheit.* Afterward he was several times imprisoned for inciting violence by his writings, the last time for approving the assassination of President McKinley.

Moszkowski, *mosh kof′ske,* MORITZ (1854–), a Polish pianist and composer. He studied at Dresden and Berlin. When nineteen years old, he made his début as a virtuoso and afterward settled at Berlin, which he made his headquarters. After 1897 he identified himself with Parisian musical circles. His *Spanish Dances,* among his first pretentious works, are considered remarkably fine, as are others of his later works, such as his symphonies, sonatas and suites. See MUSIC.

Moth, the popular name of a numerous and beautiful division of insects resembling butterflies. They are readily distinguished from butterflies by their antennae, which are feather-like or tapering, never terminating in a knob; by their wings being horizontal when resting, and by being seldom seen on the wing, except at night. Butterflies are harmless, but some of the moths, especially in their larval state, are extremely injurious to both vegetable and animal tissue. Other moths, however, are useful. See SILK, *color plate.*

Mother-of-Pearl or **Na′cre,** the hard, silvery, brilliant, internal layer of several kinds of shells, particularly of the oyster family, often variegated with changing purple and azure colors. It is destitute of coloring matter, but is composed of a series of minute and slightly imbricated layers, or ridges, which have the power of decomposing the rays of light, thus producing beautiful rainbow-like hues. The large oysters of the tropical seas alone secrete this coat of sufficient thickness to render their shells available for the purposes of manufacture. Mother-of-pearl is extensively used in the arts, particularly in inlaid work, and in the manufacture of handles for knives, buttons, toys, snuffboxes and other small articles.

Motion, LAWS OF. See DYNAMICS.

Mot′ley, JOHN LOTHROP (1814–1877), an American historian, born at Dorchester, Mass. His education was received at Harvard University and at Göttingen, in Germany. While in Germany he became intimately acquainted with Bismarck. His first publication, besides contributions to magazines, was a novel called *Morton's Hope,* succeeded by a second novel, *Merry-Mount,* but these were both unsuccessful. From 1861 to 1867 he was ambassador to Vienna, and from 1869 to 1870 he was minister to London. Motley is chiefly noted for his works on the Netherlands, *The Rise of the Dutch Republic, The United Netherlands* and *The Life of John Barneveldt.* The years which he spent in Holland in study for his work resulted in most accurate and trustworthy accounts, and his history is a standard for the period of which it treats. (See portrait on next page.)

Mot′mots, a genus of American birds, found from Mexico to Brazil, but preferring the vicinity of streams in dense forests. They live solitary or in pairs. In plumage they may be brown, green, cinnamon or black. The head is narrow, the bill crow-like, and the longest of the graduated tail feathers are tipped with a broadened vane.

Mo′tor Nerves or **Ef′ferent Nerves.** See NERVOUS SYSTEM.

Mott, LUCRETIA COFFIN (1793–1880), an American reformer, born on Nantucket Island, educated in a Friends' School near Poughkeepsie, N. Y., and later chosen a minister in the Society of Friends. She and her husband were ardent supporters of emancipation and were members of the Anti-Slavery Society. Because Mrs. Mott was excluded with other women from the World's Anti-Slavery Convention in London, she and Elizabeth Cady Stanton began to discuss woman's rights and brought the subject before a convention at Seneca Falls, N. Y. Mrs. Mott always worked for universal peace, for temperance, for anything that would elevate mankind.

JOHN LOTHROP MOTLEY

Mott, VALENTINE (1785–1865), an American surgeon, born in Glen Cove, Long Island. He studied in London and Edinburgh and in 1811 was professor of surgery in Columbia College; afterward he held positions in the faculties of other colleges. He early gained a world-wide reputation for boldness and originality as surgeon and was considered the most intrepid operator of his time.

Moukden, *mook′den.* See MUKDEN.

Mould. See MOLD.

Moulmein, *mowl mine′.* See MAULMAIN.

Moulton, Ellen Louise Chandler (1835–1908), an American poet born at Pomfret, Conn. She was educated in Emma Willard's Seminary, Troy, N. Y. She showed marked literary ability at an early age, and before her twentieth year had written *This, That and the Other.* In 1835 she married William Moulton. Among her most popular works are, *Juno Clifford, Bedtime Stories,* of which there were three series, *Random Rambler, Ourselves and Our Neighbors, Lyrics and Sonnets and At the Wind's Will.*

Moultrie, *mole′tri,* WILLIAM (1731–1805), an American soldier, born in South Carolina. Though associated with loyalists, he early espoused the patriot cause in the Revolution, entered the South Carolina provincial congress, took command of a regiment of state militia and defended Charleston against an attack by Sir Henry Clinton, in March, 1776. For his service in repulsing a fierce attack by the British fleet under Parker, he was thanked by Congress, and the fort which he had built on Sullivan Island was named Fort Moultrie. He was also made brigadier general, was given command of the army in the states of Georgia and South Carolina and was active in defending this territory. He was captured at Charleston in 1780, but was exchanged, and was made a major general in the Continental army. He was chosen governor in 1785 and again in 1794.

Mound Bird, one of a group of fowls which have the common habit of building, for a nest, a large pile of vegetable matter, which, by the heat of its decay hatches the eggs that are distributed through it. The young are quite strong when hatched and make their way out of the pile of refuse and shift for themselves. The birds return to the same nesting place year after year, increasing the size of the mounds, and it is probable that several females use the same heap. The mounds vary in size and character with the species that builds them. The mound birds are principally natives of Australia, though some species are found in New Guinea and other islands. The Australian brush turkey is one of the largest and best known.

Mound Builders, the name given to the people who built the artificial hillocks or mounds which exist in the valleys of the Mississippi, the Ohio, the Missouri and their tributaries. The mounds are of earth or sand, round, oval, square and in some cases polygonal or triangular, varying greatly in height and size. Sometimes they are erected on the summit of a hill; sometimes they stretch irregularly across the plains. The most important mound still in existence is that of Cahokia, in Illinois. This rises in the midst of about sixty others in four successive terraces, reaching an elevation of ninety-one feet and covering a surface of twelve acres. Some of these mounds appear to have been defensive works, others to have served for ceremonial purposes, and many were certainly burial places. The effigy mounds are the most curious. These are of diverse forms, grouped without any apparent order, representing men, quadrupeds, birds and reptiles. The most celebrated of these effigy mounds is the Serpent, on a hill overlooking Brush Creek, Adams County, Ohio. It now belongs to the Peabody Museum and is enclosed in a public park. The folds of the serpent give a length of 700 feet, in the mouth is an egg, represented by an elliptical mound, the large axis of which measures 160 feet.

The pottery of the Mound Builders was made of clay, dark gray in color, often with a shade of blue in it. Some of their vessels have a capacity of over ten gallons, others of several quarts. Some of the pottery is painted, usually black or very dark gray, but sometimes red, yellow, white or brown. The ornamental parts are often distinguished by different colors, and the shading is always tastefully done. Among the articles obtained from the mounds were necked vases; cooking vessels, sometimes provided with a cover and nearly always with handles; lamps, generally of black pottery; tureens or basins; cups, and pipes. At Mound City, Ill., four pipes were found, with human profiles of a singularly characteristic type. One pipe, representing a woman, will stand comparison with the Mexican sculptures, while one was found in Indiana representing on its opposite faces a death's head and the head of a goose.

The weapons discovered in the mounds consist mainly of arrowheads, made of quartzite, jasper, granite and many other kinds of stone, highly polished. Among the ornaments are pearls, shells, perforated teeth of animals, bones small birds, claws of wild beasts, rings and of earrings of copper, sometimes covered with a film of silver.

Some writers claim that the present-day indians are the descendants of the Mound Builders; others hold that the race which raised the great mounds has disappeared.

Mounds'ville, W. Va., the county-seat of Marshall co., 11 mi. s. of Wheeling, on the Ohio River and on the Baltimore & Ohio railroad. The state penitentiary is located here, and the city has a fine courthouse. It is in an agricultural and coal-mining region and contains glass works, lumber mills, foundries, flour mills and other factories. The place was once called Grave Creek, and the present name was given on account of one of the largest mounds in the United States. This ancient structure is 70 feet in height, 820 feet in circumference at the base and 63 feet in diameter at the summit. Population in 1900, 5362.

Mountain, a mass of earth and rock rising above the surface of the globe higher than a hill. Mountains are usually found in groups, systems, ranges or chains, though isolated mountains, due to volcanic action, are also found. The elevation of great mountain masses is due to movements of the earth's crust, but mountains of considerable mass have also been carved out by erosion. The highest mountain in the world is Mount Everest, one of the Himalayan range, which is 29,002 feet above the level of the sea. There are three important methods of measuring mountains, namely, by the barometer, by observation of the boiling point of water, and by calculation from data procured by accurate surveying instruments, the necessary formulae being supplied by trigonometry. This last is by far the most accurate method. See Plain; Plateau.

Mountain Ash, a beautiful shrub or small tree, growing throughout North America, along the northern boundary of the United States. It has handsome leaves and large clusters of brilliant red fruit that make it highly ornamental. A closely allied species is the mountain ash, or *rowan tree,* of Europe, which has long been considered an ornamental tree of great value. Neither of these is an ash in the true sense of the word, as both trees belong to the rose family.

Mount Carmel, *kahr'mel,* Pa., a borough in Northumberland co., about 45 mi. n. of Harrisburg, on the Lehigh Valley, the Pennsylvania and the Philadelphia & Reading railroads. It is in a mountainous region near anthracite coal mines, and it contains manufactures of lumber, mining implements and supplies, clothing, flour, cigars and other articles. Population in 1900, 13,179.

Mount Clem'ens, Mich., the county-seat of Macomb co., 20 mi. n. e. of Detroit, on the Clinton River, at the head of navigation, and on the Grand Trunk railroad and several electric railways. The city has a beautiful location, contains noted mineral springs with curative qualities and has become a popular summer and health resort. There are good hotels, large sanitariums and bathing places and a public library. The city has a large beet sugar factory, cooperage works and casket, wagon, implement and other factories. The place was settled in 1802 and was incorporated in 1872. Population in 1904, 7108.

Mount Desert, *de zurt'* or *dez'urt,* the largest of the many islands on the coast of Maine. It is separated from the mainland on the n. w. by a channel about 2 miles wide, and on the n. e., by Frenchman's Bay. The island is 15 miles long and 8 miles wide with an area of about 100 square miles. The surface is mountainous, some heights reaching 1500 feet. There are three harbors, Bar Harbor, Northeast and Southwest, and several villages, the most important of which is Bar Harbor, famous as a summer resort (See BAR HARBOR). The island was settled in 1608 by French Jesuits, and the first permanent settlement was made by the English in 1761, at Somerville.

Mount Vernon, *vur'non,* the home and estate of George Washington, in Fairfax County, Va., on the right bank of the Potomac, fifteen miles s. of Washington, D. C. The mansion was built in 1743 by Washington's brother Lawrence, and it was named after Admiral Vernon of the British navy. Washington's tomb is also on this estate, a few hundred yards from the house, near a picturesque ravine. Washington bequeathed the estate to Bushrod Washington, who in turn left it to his nephew, from whom it was purchased in 1858 by the Ladies' Mount Vernon Association, and it is carefully maintained for its historic interest.

Mount Vernon, ILL., the county-seat of Jefferson co., 76 mi. s. e. of Saint Louis, Mo., on the Chicago & Eastern Illinois, the Southern, the Louisville & Nashville and other railroads. The city is in a fertile agricultural region, near extensive deposits of bituminous coal. It has a valuable trade in grain and live stock and contains manufactures of flour, lumber, cars, dressed marble, and machine shop, creamery and other products. The supreme court building is an attractive structure. The place was laid out in 1819 and was incorporated in 1872. Population in 1900, 5216.

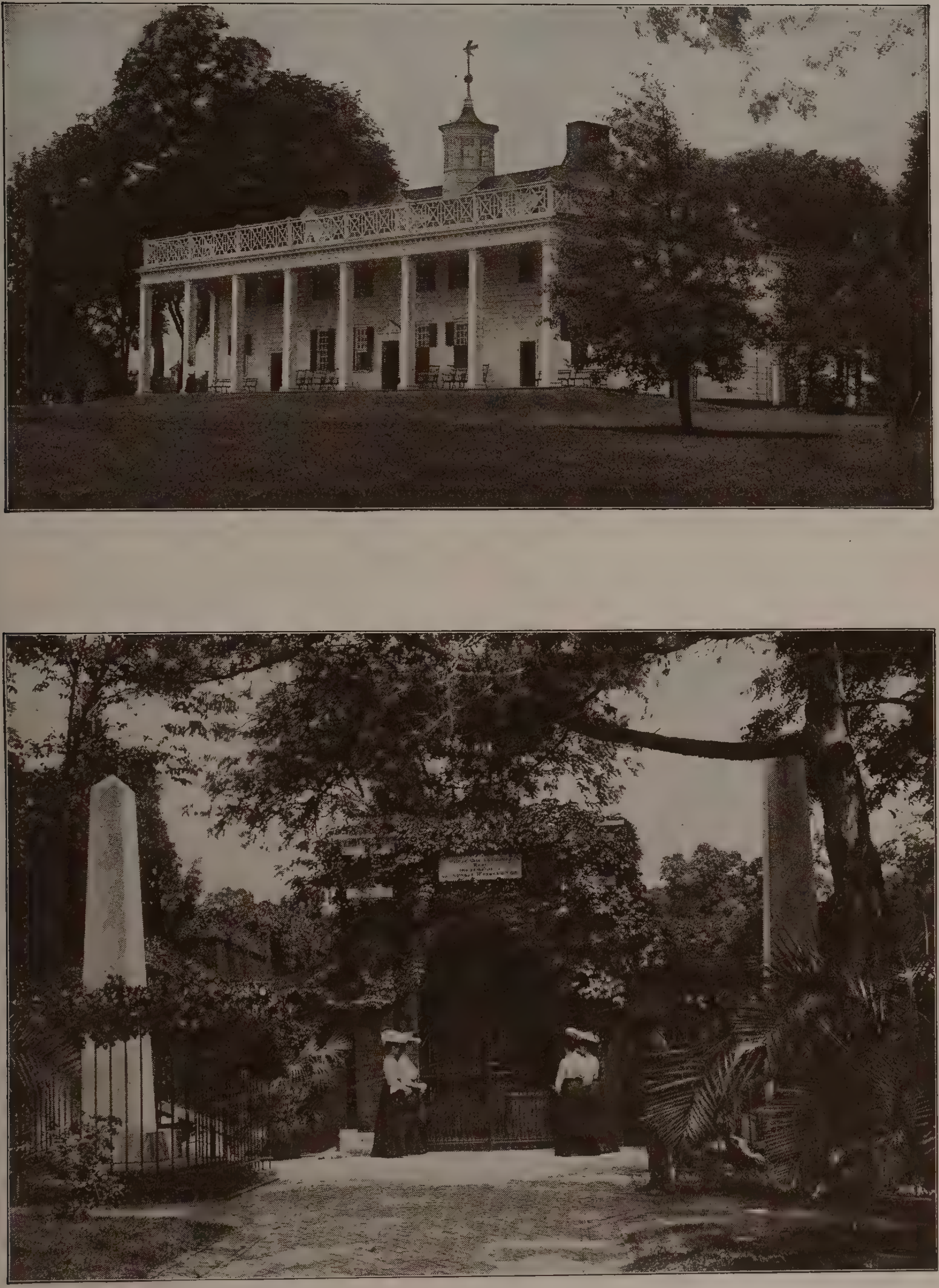
Mount Vernon, IND., the county-seat of Posey co., 18 mi. w. of Evansville, on the Ohio River and on the Louisville & Nashville and the Evansville & Terre Haute railroads. The city is in a fertile region, which also has deposits of coal, and it contains manufactures of flour, hominy, lumber, brick and various foundry and machine shop products. It has a fine courthouse and a Carnegie public library. The place was settled in 1812 and was chartered as a city in 1853. Population in 1900, 5132.

Mount Vernon, N. Y., a city in Westchester co., on the Bronx River and an arm of Pelham Bay and on the New York Central and the New York, New Haven & Hartford railroads. Adjoining New York City on the north, thirteen miles from the Grand Central station, it is chiefly a residence suburb. There is a Carnegie library, a good city building, a new postoffice, a hospital and many churches and schools. The place was settled in 1852 and became a city in 1892. Population in 1905, 25,006.

Mount Vernon, OHIO, the county-seat of Knox co., 25 mi. n. of Newark, on the Baltimore & Ohio and the Cleveland, Akron & Columbus railroads. The city is in an agricultural region, near natural gas wells, and it contains large Corliss engine works, flour and lumber mills, bridge works and furniture and other factories. The city has good public schools and a public library. Population in 1900, 6633.

Mouse, the name of a number of species of little animals, of which the most familiar is the domestic mouse. There are more than one hundred twenty-five species of the genus, which includes also the rats. The *harvest mouse,* the smallest of quadrupeds, constructs a little globular nest of grass, entwined round and supported by the stalks of the corn or wheat. In this he spends his winter asleep. The common *field mouse* is a dusky brown, with a darker

COMMON HOUSE MOUSE



WASHINGTON'S HOME AND HIS TOMB AT MOUNT VERNON

strip along the middle of the back, while the tail is of a white color beneath. The *short-tailed field mouse*, or *meadow mouse*, is not a true mouse, but is one of the voles. On the back it is of a reddish-brown color, inclining to gray; the under parts are lighter, or ashy-brown, and the tail and feet are of a dusky-gray color. The dormouse also is of a different family from the true mice. The jumping mice of America are more closely related to the Jerboas than to the true mice. See JERBOA.

FIELD MOUSE

Mouth, THE, the first enlargement of the alimentary canal. It contains the teeth and tongue and is bounded above, at the front, by the hard palate, or "roof of the mouth," which separates it from the nose, and at the back, by the soft palate. The mouth is connected with the pharynx by the *isthmus of the fauces*, which has two muscular pillars on each side, between which are situated the *tonsils*. See PALATE.

Mouth Organ. See HARMONICA.

Mowing Machine, a machine for cutting hay by horse power. The essential parts of the mowing machine are the cutting apparatus, which is similar to that of the reaping machine, and the wheels, upon which the frame rests. The mowing machine is much simpler than the reaper, but is equally effective in the work for which it was designed. A good machine will cut from seven to ten acres of grass in a day. See REAPING MACHINE.

Mozambique, *mo zam beek'*, the name formerly given to Portuguese East Africa. It now is applied only to the northeastern part of that colony. See PORTUGUESE EAST AFRICA.

Mozambique Channel, the passage between the east coast of Africa and the island of Madagascar. Its length is somewhat over 1000 miles; its breadth varies from about 250 miles, at the center, to 600 miles, at the outlet. In its northern part are the Comoro Islands.

Mo'zart (German pronunciation *mo'tsahrt*), JOHANN CHRYSOSTOMUS WOLFGANG AMADEUS (1756–1791), a German composer, born at Salzburg. When six years old, Mozart appeared at the Austrian court with great success; at seven he published several sonatas, and at eight he played the most difficult works of Bach and Handel before the king of England. In 1769 Mozart, who had been made master of the concerts at the court orchestra at Salzburg, commenced a journey to Italy in company with his father. At Milan in 1770 he composed, in his fourteenth year, his first opera, *Mithridates*, which was performed more than twenty times in succession. He wrote most of his best works in Vienna, including his famous operas, *The Marriage of Figaro* and *The Magic Flute*, and his last work, the famous *Requiem*. The amount of work done by Mozart during his short life is almost incredible, and in every kind of composition, whether vocal or instrumental, he excelled.

WOLFGANG MOZART

Mucilage, *mu' si laje*, a solution of the gum of certain plants in water. It is easily made by dissolving gum arabic in hot water and adding a few drops of carbolic acid to keep it from molding. The name is commonly applied to such prepared solutions as are used for paste.

Mu'cus, a clear, sticky fluid, secreted by mucous membranes, forming a layer of greater or less thickness on their surface. It covers the lining membranes of all the cavities which open externally, such as those of the mouth, nose, lungs and intestinal canal, and it is renewed with more or less rapidity. Besides keeping these membranes in a moist and flexible condition, it also protects them against the action of the air, of the food and of the different glandular fluids that might otherwise irritate and inflame them.

Mud Hen. See Coot.

Mud Puppy or **Water Dog**, a salamander which never loses its larval gills. It grows to a length of about a foot and is spotted brown in color, excepting the gills, which are dark red. These salamanders live in America, among the rocks and weeds at the bottom of lakes, and feed on insects, worms and frogs. The name is also applied to other salamanders, especially the axolotl.

Mud Turtle, a popular name throughout the United States for a turtle which is dark brown in color, with lighter spots on the head and neck. See Turtle.

Muez'zin or **Mued'din**, a Mohammedan crier, attached to a mosque, whose duty it is to proclaim the *ezam*, or summons to prayers, five times a day—at dawn, at noon, at 4 P. M., at sunset and at nightfall. He makes his proclamation from the balcony of a minaret; and as this elevated position enables a person to see many of the private proceedings of the inmates of the neighboring houses, the post of muezzin is often entrusted to a blind man.

Mug'wump, a term sometimes given to a citizen who is nominally affiliated with a certain political party, but who often votes for other candidates. It was applied to the Republicans who voted the Liberal Republican ticket in 1872, but it became especially common in 1884, as applied to those who called themselves "Independent Republicans" and refused to vote for James G. Blaine.

Muhlenberg, *mu'len burg*, Frederick Augustus Conrad (1750–1801), an American politician. He was the son of Heinrich Muhlenberg, the founder of Lutheranism in America, and was born at New Providence (now Trappe), Montgomery County, Pa. He studied in Germany, and upon his return to America he entered the Lutheran ministry, becoming pastor of an influential church in New York City. In 1776 he returned to Pennsylvania and, entering politics, labored earnestly for the patriot cause. He was elected to Congress, was many times reëlected and was chosen speaker of the first House of Representatives. As chairman of the committee of the whole in 1795, he cast the deciding vote that saved the Jay Treaty.

Muhlhausen, *mul'how zen*, a town of Prussia, in the Province of Saxony, 30 mi. n. w. of Erfurt on the Unstrut. The churches of Saint Mary and Saint Blasius and the ancient town hall are important structures. The town is an important industrial center. The leading industries include the manufacture of cotton, cotton yarns, woolens, damask, chemicals and cigars. Population in 1900, 33,428.

Mu'ir, John (1838–), an American geologist, naturalist and explorer. He was born at Dunbar, Scotland, and was educated in Scotland and at the University of Wisconsin. He explored parts of the Pacific coast which had previously been little known, discovered the glacier in Alaska which is named for him and visited the Arctic regions with an expedition in search of the De Long party. Becoming interested in the subject of forestry, he spent much time and energy working for the preservation of forests and the establishment of forests and parks. His writings include *The Mountains of California*, *Our National Parks* and many articles on the physiography and natural history of the Pacific coast.

Muir Glacier, one of the largest and best-known glaciers of Alaska, named from its discoverer, John Muir (See Muir, John). It is situated at the head of Glacier Bay, and has a frontage of nearly three miles and an altitude varying from 150 to 210 feet. Its highest point probably extends 1000 feet above the bed of the ocean. The glacier extends up the mountains for more than fifteen miles and covers an area of 350 square miles, but the actual area drained by it is estimated to exceed 800 square miles. The front presents a vertical or overhanging cliff, resembling in structure rugged, waterworn rock. From this cliff icebergs are constantly breaking and falling, the fall being accompanied by a crash and violent disturbance in the sea. See Glaciers.

Mukden, *mook' den*, or **Moukden**, a town of China, capital of Manchuria and of the Province of Liao-tung, about 400 mi. n. e. of Peking. It is surrounded by a wall and has a second wall which includes the government offices, the palace and other important buildings. The tombs of the early rulers of the present Manchu dynasty of China are located at Mukden. During 1904 and 1905 several great battles which placed Japan among the foremost military powers of the world were fought near Mukden (See Russo-Japanese War). Population, about 150,000.

Mul'berry, a genus of trees belonging to the lily family, distinguished by large leaves and a fruit which in form and structure resembles the blackberry. Of the several sorts, the *common black mulberry* is the best known and has been cultivated in Europe for more than a thousand years, because of its fruit, which is used as dessert and also preserved in the form of a syrup or light jelly. The *white mulberry* is the most interesting, because it furnishes food for silkworms. This tree has been introduced to some extent into the United States, in the hope that the raising of silkworms might become profitable here. The *red mulberry* bears a fruit of a rich, deep-red color and is native of America. The *paper mulberry,* now much cultivated in Europe, a distinct genus, belonged originally to Japan, where its bark is used in the manufacture of paper. The *Russian mulberry* is a small, hardy shrub that grows very rapidly and has been introduced into the western United States as a hedge plant. See SILK, *color plate.*

MULBERRY

Mule, the name applied to any animal produced by a mixture of different species, but specifically denoting the long-eared animal which is a cross between an ass and a mare. The head of the mule is long and thin, its tail is bushy and its mane is short. The mule is employed as a beast of burden in Spain, Portugal, Italy, in the East, in Spanish America and in the United States. For heavy work it is generally preferred to the horse. See ASS; HORSE.

Mullein, *mul'lin,* a large coarse weed, with large fuzzy leaves on a tall stem, which is crowned by a spike of yellow flowers. It is common in waste places and where the soil is poor. The seed scatters very rapidly. The *common, white* and *moth mulleins* are three species, of which the last is the most common and the most injurious. The plant grows about two feet high and has pale purplish flowers. The roots should be grubbed out in the fall, to prevent the spread of this weed.

Mül'ler, FRIEDRICH MAX (1823–1900), a celebrated German philologist, son of the poet Wilhelm Müller and commonly known as Max Müller. He entered the University of Leipzig, where he studied Sanskrit under Brockhaus and published a translation of the *Hitōpadēsa,* a collection of Sanskrit fables. In 1846 he went to England and established himself at Oxford, where he became ultimately sub-librarian at the Bodleian library and professor of modern languages, a position which he held until his death, though he practically resigned in 1875. He was a foreign member of the French Institute and received the degree LL.D. from Cambridge and Edinburgh. His numerous writings included an edition of the *Rig-Veda,* a *History of Ancient Sanskrit Literature, Science of Language, Chips from a German Workshop, On the Origin and Growth of Religion, Selected Essays, The Science of Religion* and *Natural Religion;* and he was the editor of the series of *Sacred Books of the East,* undertaken by the university.

Mul'let, a name common to two groups of fishes, the gray mullets and the red mullets. Of the true mullets, the common *gray mullet,* found around the shores of western Europe, and in particular abundance in the Mediterranean, is the best known. It grows to the length of eighteen to twenty inches and sometimes weighs from twelve to fifteen pounds. It has the habit of rooting in the mud or sand in search of food. Of the American species, the *striped mullet* is found from New York southward and appears in the markets in early autumn. The *red mullet* is caught in large numbers in the Gulf of Mexico.

GRAY MULLET

Mu'lock, DINAH MARIA. See CRAIK, DINAH MARIA MULOCK.

Mum′my, a dead body embalmed and dried after the manner of those taken from Egyptian tombs. An immense number of mummies have been found in Egypt, consisting not only of human bodies, but of various animals, as bulls, apes, ibises, crocodiles and fish. They are yellow in color and light in weight. The processes for the preservation of the body were various. The bodies of the poorer classes were merely dried by salt of natron, a mixture of salt, saltpeter and sodium sulphate, wrapped up in coarse cloths and deposited in the catacombs. The bodies of the rich underwent the most complicated operations and were laboriously adorned with all kinds of ornaments. Embalmers of different ranks and duties extracted the brain through the nostrils and removed the entrails through an incision in the side; the body was then washed and salted, and after a certain period, the process of embalming, properly speaking, began. This consisted, in general, in steeping the body for seventy days in a strong solution of natron. It was then washed and wrapped in linen bandages; each finger and toe was separately enveloped or sometimes sheathed in a gold case, and the nails were often gilded. The bandages were then folded round each of the limbs and, finally, round the whole body, to the number of fifteen to twenty thicknesses. The head was the object of particular attention; it was sometimes enveloped in several folds of fine muslin, the first glued to the skin, the others to the first, and the whole was then coated with a fine plaster. Mummies have been found in Peru and in Mexico, but they are much less carefully preserved. Natural mummies are frequently found preserved by the dryness of the air. See EMBALMING.

Mumps, a disease of the salivary glands, which is accompanied by swelling along the neck, extending from beneath the ear to the chin. It may appear on one side of the face only, on both sides of face or first upon one side and then on the other. The premonitory symptoms are a soreness and stiffness of the jaw, with pain in the ear, which is soon followed by the swelling. Usually no treatment is necessary, except to keep the bowels regular and to protect the face from exposure to the cold. For several days after the swelling has subsided, a cold is liable to produce serious complications, which sometimes terminate in very dangerous brain diseases.

Münchhausen, *münK′how zen,* HIERONYMUS KARL FRIEDRICA, Baron (1720–1797), a German officer who served in several campaigns against the Turks in the Russian service, 1737–1739. He was a passionate lover of horses and hounds, of which, and of his adventures among the Turks, he told the most extravagant stories; and his imagination finally so completely got the better of his memory that he really believed his most improbable and impossible fictions. *Baron Münchhausen's Narrative,* a small book by Rudolph Erich Raspe, contains the collection of stories told by Münchhausen.

Muncie, *mun′sy,* IND., the county-seat of Delaware co., about 50 mi. n. e. of Indianapolis, on the White River and on the Cleveland, Cincinnati, Chicago & Saint Louis, the Lake Erie & Western, the Chicago, Cincinnati & Louisville and other railroads, all of which are connected by a belt line encircling the city. The surrounding region contains deposits of natural gas and coal, and there is a large trade in farm produce and live stock. The city has extensive iron and steel works, glass factories, paper and flour mills, canneries and manufactures of silverware, wagons, engines, clothing and various other articles. It contains a normal school, a fine courthouse, a city hospital, a public library and a good Federal building. Population in 1900, 20,942.

Mun′goose. See MONGOOSE.

Munich, *mu′nik,* (German *München*), the capital of Bavaria and of the District of Bavaria, situated on an extensive plateau, about 1700 feet above sea level, chiefly on the left bank of the Isar. The old town has a quaint and irregular character, but the new town, which has sprung up chiefly to the north and west, has a regular and imposing appearance, and altogether Munich is one of the finest towns in Germany. The center of the life of the city is the Max-Joseph-Platz. Here is located the royal palace, which forms a very extensive series of buildings, chiefly in the Italian style, and contains many magnificent apartments and artistic treasures. Connected with it are the court church and the court and national theater, one of the largest theaters in Germany. Munich is famous for its art galleries, especially the Old Pinakothek, or Museum of Painting, and the New Pinakothek, the Glyptothek, or Museum of Sculptures; the Kunstgewerbehaus, or Industrial Art Building, and the Schack Gallery. The great Bavarian National Museum is world-renowned. The royal library has over 1,300,000 volumes and is one of the richest libraries in the world. The university is attended by over four thousand students and has a library of over 400,000 volumes. There is an academy of science, an academy of arts and many fine churches, including the cathedral, which dates from the fifteenth century. There are many beautiful monuments in Munich. The so-called English Garden is a fine park of over 500 acres, watered by two arms of the Isar.

The industries of Munich are numerous, and some of them are important. Brewing is the chief industry, and immense quantities of beer are exported. There are manufactures of leather, gloves, jewelry, glass, carriages and musical instruments; and the mathematical, optical and surgical instruments made in Munich are famous throughout the world. The city is the seat of the high courts of legislature and of law and of all the more important offices of the state. Munich first became known under Henry the Lion in the twelfth century. Much of the magnificence of the city is due to the munificence of King Louis I. Population in 1900, 499,932.

Municipal, *mu nis'e pal,* **Government,** the government of a city, town, village or other minor civil division of a state. It is most often applied in common speech to the administration of the affairs of a city. The government of a municipality is chartered by the state and represents the state at the same time that it conducts the special activities of the city itself. For instance, in the matter of charity, the exercise of the police power, sanitation and the administration of justice, it is almost solely the agent of the state.

Municipal government as now organized in the United States, and, in fact, generally throughout the world, is administered by a mayor and a common council, through executive boards, partly responsible to the mayor, partly to the council and partly exercising independent functions. The mayor is sometimes elected by the people, as usually in the United States, but often by the council. He is the head of the executive department of government and has the appointment of a large number of officials. The council may consist of one or of two houses. In the latter case the lower house is usually chosen directly by the people by districts; the upper house may be chosen by larger districts or for the city at large, or it may be especially appointed by the whole council from its own number. In the hands of the council are most of the legislative functions, though the mayor usually has a veto power over its measures. The judicial officers of the municipality, as said above, are usually merely agents of the state, although there are local justices for the purpose of trying petty offenders without delay.

There has been much discussion concerning the functions of a municipal government, but certain functions are universally admitted, such as the protection of life, health and property, the regulation of public education and the control of charities and correction. Others, such as the control, ownership or management of public utilities—as transportation, communication, lighting and water supply—the providing for recreation and other similar functions, are coming more and more to be considered a part of the natural, necessary field of the municipal government (See MUNICIPAL OWNERSHIP).

The city is supported financially by various means, such as taxation, special assessments, licenses and fees, on the one hand; loans, bond issues and bequests, on the other. Appropriations for expenses usually are made by the council or, where the power has been especially granted, by executive boards.

The remarkable growth in the number of cities and in the proportion of the population living in cities, during the last half century, has led to the development of serious municipal problems, chief among which is the result of the growth of fraud, extravagance and corruption in government. Of late years there have been many movements in favor of remedying these evils, of which those looking toward independence in politics and the regulation of municipal charters by general state acts, rather than by special acts, have proved most efficient.

Municipal Ownership, in general, ownership of anything by a municipality. The term is specifically applied to the ownership, by a city, of public utilities, such as waterworks, lighting plants and railways. There is a division of opinion as to the expediency of a city government managing other than the most necessary functions of government, such as the protection of property and the public health. In recent years there has been a growing sentiment in favor of the extension of the municipal functions, so that at the opening of the twentieth century a large majority of cities owned and operated at least one ordinary public utility. In the United States, while, in 1800, there were 15 private waterworks plants and one public, at the end of the century there were more than 1700 public plants and less than 1500 private. In Great Britain and Ireland the proportion is even greater in favor of public ownership, and in Canada 75 per cent of the cities own their own water plants. In regard to the other utilities there is more disagreement, only about two per cent of the cities in the United States owning their gas works; four per cent, their sewage disposal plants; not more than a half dozen cities, their street railway systems; about one-sixth of the cities, their electric lighting plants. The other utilities, such as telephones, ferries, subways and public markets, are owned by cities in a few scattered instances. See MUNICIPAL GOVERNMENT.

Munkacsy, *mün kah′che,* MIHALY (1844–1900), a Hungarian genre and historical painter, whose real name was Michael Lieb, born at Munkacs. After hard work and privations he was enabled to study at Gyula, Vienna, Munich and Düsseldorf, and in 1872 he settled in Paris. Among his best-known pictures were *Last Day of a Condemned Man*; *Milton Dictating Paradise Lost*; *Christ before Pilate*, his most famous picture; *The Crucifixion*, and *The Last Moments of Mozart*.

Munroe′, KIRK (1856–), an American author of books for boys, born in Wisconsin. He studied civil engineering at Harvard, but followed this profession for a short time only. The experience and information gained in the West in this work, however, furnished material for many of his stories. He soon went into newspaper work in New York City and was the first editor of *Harper's Young People*. After his marriage, he made his home in southern Florida, a district that colored his later writings. They include *The Flamingo Feather*, *At War with Pontiac*, *Dory Mates*, *The Belt of Seven Totems* and *The Outcast Warrior*.

Mun′see (wolf tribe), the most warlike portion of the Delaware indians, and the natural leaders of the tribe in all their councils. They were prominent in the early history of New York and New Jersey, but are now widely scattered, those in the United States being comparatively civilized and able to care for themselves.

Mun′ster, a town of Prussia, capital of the Province of Westphalia and of a government district of its own name, situated on a wide plain on the Aa, 78 mi. n. n. e. of Cologne. Among its chief buildings are the cathedral and several other churches, the castle, the townhall and the Stadtkeller, which contains the museum of the Society of Arts. It has a university and a library of about 150,000 volumes. The manufactures include woolen, linen and cotton goods, paper and leather. The most memorable events in the history of the town occurred in 1534 and 1535, when it fell into the hands of the fanatical Anabaptists. Population in 1901, 63,776.

Muradabad, *moo rud a bahd′,* or **Moradabad,** a town of British India, capital of the District of Muradabad in the Northwest Provinces. It is noted for its metal work and is the center of local trade. It has a Protestant church, an American mission and a cantonment. Population in 1901, 75,128.

Mu′ral Circle, an astronomical instrument, consisting of a telescope attached to a vertical brass circle, which turns upon an axis passing through a stone pier. The brass circle revolves exactly in the plane of the meridian and is carefully divided into degrees and minutes. Attached to the stone pier, and at equal distances apart, are six microscopes for the purpose of viewing the graduated circle and determining exactly its position and consequently that of the telescope. The mural circle is regarded as the principal fixed instrument in all the great public observatories. Its chief use is to measure angular distances in the meridian and so to determine the declination of a star, or its distance from the celestial equator. The right ascension of a star being given by the transit instrument, and its declination by this, its exact position is determined. See ASCENSION, RIGHT; DECLINATION.

Murat, *mü rah′,* JOACHIM (1767–1815), a French marshal, for some time king of Naples. He was the son of an innkeeper at Cahors and was serving in a cavalry regiment when he attracted the attention of Napoleon, whose aid-de-camp he became in 1795. His rise was rapid, many honors were shown him, and in 1800 he married Caroline, the youngest sister of Bonaparte. For his aid in the battles of Austerlitz, Jena, Eylau and Friedland, Napoleon made him marshal of the Empire, grand admiral and prince of the imperial house. In 1808 he commanded the French army which occupied Madrid, and he expected to receive the crown of Spain; but Napoleon placed him on the throne of Naples. He took the title of Joachim I Napoleon. He shared the reverses of the Russian campaign in 1812, and in 1813 he again fought for Napoleon, whose cause he deserted, however, after the Battle of Leipzig. He took up arms again in 1815 for Napoleon, but was defeated and forced to leave Italy. After the overthrow of Napoleon he escaped to Corsica, and later he set sail for Naples with a view to its recovery. He landed at Pinzo, but was immediately captured, tried by a court martial and shot.

Mur′chison, Roderick Impey, Sir (1792–1871), an English geologist, born in Tarradale, Ross. Murchison re-classified the older formations, introducing the Silurian system and, after his survey of Russia, the Permian system, into geological classification. He was an extensive writer on his favorite subject. Among his most important works are *The Silurian System*, *The Geological Structure of the Northern and Central Regions of Russia in Europe* and *Geology of Russia in Europe and the Ural Mountains.*

Murcia, *moor′the ah,* a city of southern Spain, capital of the medieval kingdom and modern province of the same name, situated on the Segura, 30 mi. n. n. w. of Cartagena. Among the public buildings, the most important is the cathedral, with a façade which is a combination of Corinthian and Composite architecture and which dates from the latter half of the fourteenth century. The episcopal palace is one of the finest in Spain. There are manufactures of woolens, silk stuffs, hats and gloves, powder, soap and musical instruments. Population in 1900, 111,539.

Mur′der, the act of unlawfully killing a human being with premeditated malice, the person committing the act being of sound mind and discretion. In the United States the old common law rule, which classed together all murders, however their circumstances differed, and punished all the same, has been changed by statutory enactments of the states, murders being divided into three classes or degrees, according to the degree of moral culpability. Murders of the first degree are those resulting from specific intent or from the commission of felony. The penalty is usually death or life imprisonment.

Murder is distinguished from *manslaughter* by the existence of malice or evil intent. Manslaughter may result from accident, due to neglect or to misdemeanors, or from sudden intent, due to sufficient provocation. The former is called *involuntary manslaughter*, the latter *voluntary manslaughter.* Punishment varies from five years' to twenty-five years' imprisonment.

Mur′free, Mary Noailles, better known as Charles Egbert Craddock (1850–), an American novelist, born in Tennessee. In childhood she lived in Murfreesboro, and many of her summers were spent in the mountains of the eastern part of the state. Being lame and unable to play with other children, she early devoted herself to reading and study. Among her numerous southern mountain stories may be mentioned *The Prophet of the Great Smoky Mountains*, *In the Tennessee Mountains*, *The Phantoms of the Foot-Bridge* and *A Spectre of Power.*

Mur′freesboro, Battle of, or **Stone River,** Battle of, a battle fought on the Stone River near Murfreesboro, Tenn., Dec. 31, 1862, and Jan. 2, 1863, between a Federal force of about 41,000, under General Rosecrans, and a Confederate force of about 35,000, under General Bragg. Rosecrans was the aggressor, advancing from Nashville against Bragg's position at Murfreesboro. The opposing generals both planned to open battle on the morning of the 31st, and each intended to begin a vigorous assault upon the enemy's right wing. The Confederates were at first successful, the Federal attack being converted into a desperate resistance. After an all-day's fight, however, the Federals retained their position, though with fearful loss of men and guns. On the morning of January 2 the Confederates again opened a vigorous attack upon the Federal position, but did not gain any important advantage and at night withdrew. The net result of the battle was a strategic advantage for the Federals, though it was probably a drawn contest from a tactical point of view.

Mu′riat′ic Acid. See Hydrochloric Acid.

Murillo, *moo reel′ yo,* Bartolomé Estéban (1617–1682), the greatest of Spanish painters, born at Seville. In 1642 he visited Madrid and was aided by Velasquez, then painter to the king, who procured him permission to copy in the Royal Galleries. Murillo returned in 1645 to Seville, where he commenced that great series of works which have now made his name so glorious. He married a wealthy and noble lady in 1648, and from this time on his fame increased and the most distinguished people of Seville became his friends. He succeeded in establishing an academy of the arts at Seville in 1660 and acted as president the first year. In his early career he painted many pictures of humble life with much charm of grace and humor; but his most celebrated pictures are of a later period and treat religious subjects with a mingled idealism and realism and with a richness of coloring which has seldom been attained. His best-known picture is the *Immaculate Conception*, and others are the *Children of the Shell,* the *Holy Family with Saint Elizabeth* and the *Vision of Saint Anthony.*

Mur′physboro, Ill., the county-seat of Jackson co., 86 mi. s. e. of Saint Louis, Mo., on the Big Muddy River and on the Illinois Central, the Mobile & Ohio and other railroads. The city is in a farming region near deposits of coal, and it contains manufactures of flour, beer, lumber, brick and foundry and machine shop products. Population in 1900, 6463.

Mur′ray, David Christie (1847–), an English novelist. He began his literary career as a writer for a Birmingham paper, was connected with London newspapers and acted as special correspondent during the Russo-Turkish War. He then took to fiction and has written a number of popular novels, among them *Aunt Rachel, The Weaker Vessel, The Way of the World, Joseph's Coat* and *In Direst Peril.*

Murray, Lindley (1745–1826), an American grammarian, born at Swatara, Pa., of Quaker parents. At the age of twenty-one he was called to the bar and acquired an extensive practice in New York City. During the Revolutionary War he engaged in mercantile pursuits with such success that he amassed a fortune. On account of failing health, he then went to England and purchased an estate near Holgate, where he passed the remainder of his life engaged in literary pursuits. He is most widely known by his *Grammar of the English Language,* which was extensively used as a text-book in the schools of England and the United States. He was also the author of a spelling book, English exercises and several other works.

Murray Firth. See Moray Firth.

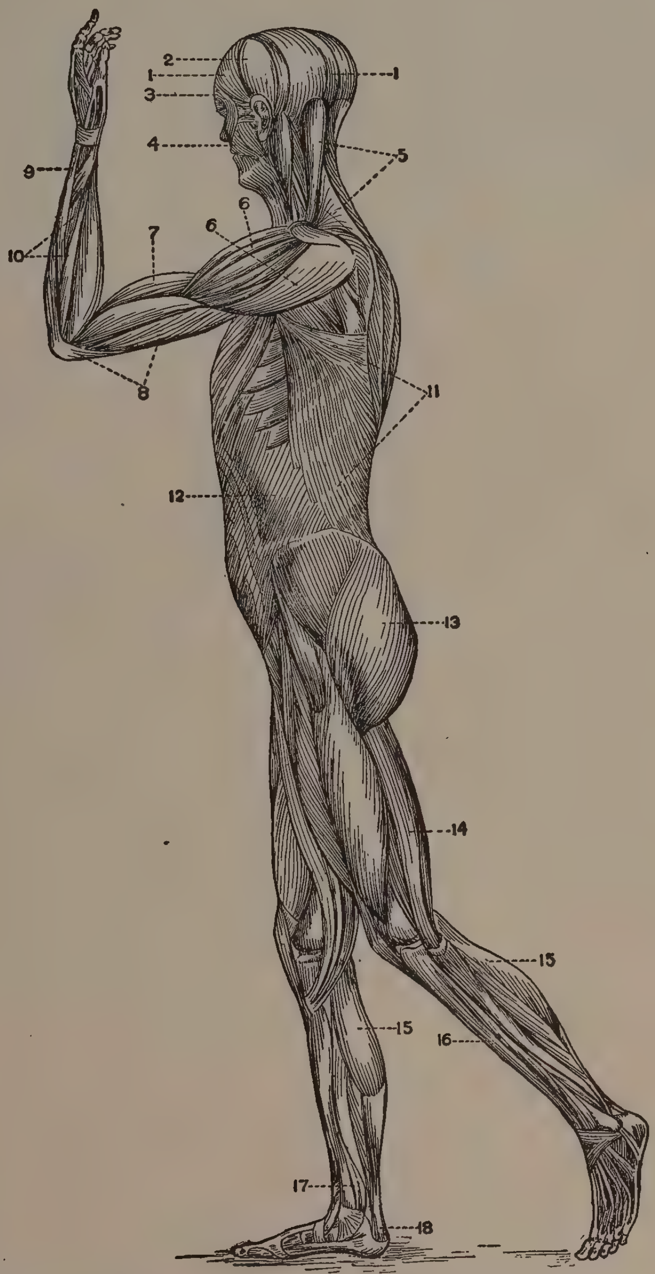
Murray River, the largest river in Australia. It rises in the Australian Alps in Victoria, flows for a long distance westward, forming the boundary between Victoria and New South Wales, then passes into South Australia, where it takes a southern direction and flows into the sea, after passing through a large shallow water known as Lake Alexandrina. There is a sand bar at the mouth which impedes navigation, but small steamers ascend the river for hundreds of miles. Its total length is about 1500 miles, and its chief tributaries are the Murrumbidgee and the Darling.

Murrumbidgee, *mur′rum bij′ee,* a large river of Australia, in New South Wales. It rises in the Australian Alps, flows in a westerly direction and empties into the Murray. Its total length is about 1350 miles, and it is navigable for over 500 miles. Its chief tributary is the Lachlan.

Muscat′, Muskat or **Maskat,** the chief city of the sultanate of Oman, a seaport on the Indian Ocean, near the east angle of Arabia. The town stands in a hollow, under cliffs 400 or 500 feet high. The streets are extremely narrow, and the town is one of the hottest places in the world. It has an excellent port and is an important center of trade, exporting coffee, pearls, mother-of-pearl, dye stuffs and drugs, and importing rice and sugar. Population, with suburbs, estimated at 30,000.

Muscatine, *mus ka teen′,* Iowa, the county-seat of Muscatine co., on the Mississippi River, about 25 mi. below Davenport, and on the Chicago, Milwaukee & Saint Paul, the Chicago, Rock Island & Pacific and other railroads. The city is located on high bluffs along the river and is an important industrial center, containing flour mills, pickle works, foundries, machine shops, lumber mills, potteries and other factories. There is a considerable trade in lumber, fruit and agricultural and dairy produce. The city has several charitable institutions and the Musser Library. It was settled in 1833 and was incorporated six years later. Population in 1905, 15,087.

Muscle, *mus′ ′l,* or **Mus′cular Tissue,** the flesh, or *lean meat,* of the body, making up about one-half the weight of the body and forming the real organs of movement. It exists under two forms, the *striped,* or *striated,* and the *unstriated.* The latter is made up of elongated, spindle-shaped cells, about $\frac{1}{600}$ of an inch in length, each of which has, near its center, a nucleus. The muscles composed of these fibers are called *involuntary,* because they are not under the control of the will. They receive their nerves from the sympathetic, or ganglionic, system (See Nervous System). This tissue forms the muscular coats of the digestive canal, of the trachea and bronchi, of the blood vessels and lymphatics, of the ducts of glands and of parts of the eye. It is found in the true skin, where its contraction under the influence of fear or cold causes the roughness known as *goose flesh. Striated* muscular tissue exists in bundles of fibers about an inch in length, which are enclosed in an elastic sheath of thin membrane, called the *sarcolemma*; and these bundles, supported and protected by connective tissue, penetrated by nerves from the cerebro-spinal system, freely supplied with blood vessels and bound in a sheath, make up the *voluntary* muscles, those under the control of the will. A few muscles of this class cannot be controlled, as those of the



THE MUSCLES. 1. Muscle of the scalp. 2. Temporal muscle. 3. The muscle that closes the eye. 4. Masseter muscle. 5. Trapezius. 6. Deltoid. 7. Biceps, the flexor muscle of the arm. 8. Triceps, the extensor muscle of the arm. 9. Extensor muscles of the thumb. 10. Extensor muscles of the wrist 11. Broad muscle of the back. 12. Oblique muscle of the abdomen. 13. Glutaeus. 14. The flexor of the leg. 15. Gastrocnemius. 16. The extensor of the toes. 17. The flexor of the toes. 18. Tendon of Achilles.

heart, the internal ear and the pharnyx. The name *skeletal muscles* is applied to this class, because so many are attached to bones, among the exceptions being those which surround orifices, as the eye or the mouth. A third kind of muscular tissue is found in the heart. It has striped fibers similar to the voluntary muscles, but neither so long nor so wide; they contain a nucleus and are united by short branches.

The peculiar characteristics of muscles are *contractility*, by which the fibers contract under such stimuli as are furnished by the nerves, by mechanical and chemical agents, by heat and by electricity; *elasticity*, by which the fibers return to their former position after the weight or power which stretched them has been removed; *tonicity*, or the slightly stretched condition in which ordinary muscles exist, even when entirely relaxed. This is shown in the gaping of a wound and in the lapping over of the ends of a broken bone. See TENDON.

Muscle Sense or **Muscular Sense,** the sense which forms the basis of our perception of the direction and operation of movements of the body and also the amount of muscular force necessary to accomplish a given act. The muscle sense lies in certain sensory nerves that are distributed in the muscular tissue and have their centers in the brain. The function of these nerves is to discharge nerve impulses to the motor nerves of the muscle. This sense is capable of being highly educated, and upon its proper training largely depends one's skill in any manual occupation. See MANUAL TRAINING; REFLEX ACTION; SENSES, SPECIAL.

Muscogee, *mus ko'je,* Okla., a town of the Creek nation, 154 mi. n. e. of Fort Worth, Tex., on the Missouri, Kansas & Texas railroad. It has a large trade with a fertile agricultural and stock-raising district. The Henry Kendall College is located here, and the town is the headquarters of a United States agent for the indians. Population in 1900, 4254.

Muses, *mu'zez,* in Greek mythology, the daughters of Zeus and Mnemosyne; the inspired goddesses of music and of song. Originally, there seem to have been but three of them, but afterward they are always spoken of as nine in number. In later times, too, some special duty was allotted to each. Thus Clio was the muse of history; Euterpe, of flute music and of lyric poetry; Thalia, of comedy; Melpomene, of tragedy; Terpsichore, of the dance; Erato, of the choral lyric; Polyhymnia, of the pantomime; Urania, of astronomy, and Calliope, of epic poetry. The muses were always represented as closely associated with Apollo, and Calliope was supposed to have been, by Apollo, the mother of Orpheus.

Muse'um, *mu ze'um,* an institution for the exhibition of objects that have an immediate relation to literature, art, science and history. The term means *the home of the muses* and was originally applied to temples sacred to the muses; its present application is of comparatively recent date. Museums are found in nearly all the leading countries of the world. Among those in Europe of special note are the museum of the Vatican at Rome, that of the Louvre in Paris and the British Museum (See BRITISH MUSEUM). The first attempt to establish a museum on a large scale in the United States was in connection with the Smithsonian Institution (See SMITHSONIAN INSTITUTION). The success of this led to the establishment of the National Museum (See NATIONAL MUSEUM OF THE UNITED STATES). There are also museums of art and natural history in nearly all large cities. Among the most noted of these are the museum in Philadelphia, established immediately after the Centennial Exposition; the Museum of Natural History and the Art Museum in Boston, and the Field Columbian Museum in Chicago.

The purpose of museums is to collect and arrange specimens that will illustrate the branches of science to which these specimens pertain and will enable one to study the evolution of the science or the subject systematically. Many of the larger museums also publish, in addition to their reports, pamphlets of interest to students engaged in the line of work which they represent, and in some of them courses of lectures are given each year. These are usually open to the public without charge.

Mush'rooms, the common name for numerous species of fungi, many of which are edible. Mushrooms are found in all parts of the world, and most species are of a very rapid growth. Certain classes are commonly known as toadstools and puffballs. While many varieties are edible, many are deadly poisonous. In some countries, mushrooms have become staple articles of food, and the natives of Tierra del Fuego and of Australia are said to live almost entirely upon them.

The parts of a typical mushroom are the cap, the gills, the ring and the stem. The cap is the expanded top, frequently umbrella-shaped. The gills are the thin plates on the under side of the cap, usually extending from the stem to its circumference; they bear the spores by which the mushroom is propagated. The ring is a growth around the stem, just below the gills, and is formed by part of the covering of the cap, left when the mushroom expands into its perfect form. The stem may be wanting altogether, as in the case of puffballs, or it may be short and thick or long and slender. The cap also takes a great variety of forms, as shown by the illustrations in the color plate. In young plants of some species, the cap, before breaking away from the ring, resembles a button, hence growing mushrooms are often said to be in the "button stage." Mushrooms take a great variety of colors, ranging from pure white to the most brilliant of rainbow tints, and in some species several colors blend (See the *golden peziza, fly mushroom* and *polyporus*, in the plate). Certain species are unpleasant or even disgusting in appearance, and all are clammy and cold to the touch. Some species growing on the trunks of trees become hardened with age, and one of these forms, the well-known *touchwood*, or *punk*, has the property of shedding light in the dark.

Edible mushrooms are cultivated for market in the United States and in many of the European countries. They thrive best in a moist atmosphere, from which bright sunlight is excluded. Gardeners usually grow them in beds of soil mixed with decaying horse manure. The beds are long and narrow and are usually covered, to protect them from the sun. The industry is very profitable, when successful. As an article of food, mushrooms contain but little nutrition and are regarded as a delicacy rather than a staple. Of the species illustrated in the plate, the *golden peziza, clavaria formosa* and *polyporus* are edible; the *russulus* acts as an emetic, and the *fly* mushroom is extremely poisonous.

Since it is difficult for those not thoroughly familiar with the species to distinguish between poisonous and edible mushrooms, these plants should never be eaten unless selected by some one whose knowledge can be relied upon. Any mushroom whose stalks have a swollen base, surrounded by a sac-like or scaly envelope (See *fly mushroom* in the plate), should be avoided, especially if the gills are white.

Music, *mu'zik,* a succession of sounds which please the ear or awaken pleasing emotions; also, the art of producing such sounds and the science which treats of their properties and relations. All sounds are the result of very rapid regular vibrations of some elastic medium, usually the air, set in motion by a sounding body, transmitted through the intervening space in the form of waves and striking the mechanism of the ear. If the vibrations are fewer than sixteen or more than 8192 in a second the sound ceases to be a musical sound; it is mere noise.

NATURE AND TERMINOLOGY OF MUSIC. Musical tones vary in three respects—*pitch, intensity,* or loudness, and *timbre,* or *quality.* The pitch of a tone, or its relative position in a scale of high and low tones, is determined by the number of vibrations of the medium in a given time, a small number of vibrations producing a deep, or *low,* tone, a higher number producing an acute, *high,* or shrill tone. The intensity, or loudness, of a tone is determined by the size of the vibrations, loud tones being produced by wide vibrations in the medium, the soft tones by small vibrations. The quality of a tone depends upon the character of the substance which causes the vibration. For instance, the musical tone caused by the vibrations of a copper string differs in quality from one caused by the vibrations of the vocal cords of the throat. The element of a musical tone which is most commonly under the control of a performer is its pitch. Therefore, this subject will be considered in most detail.

Consider a tone produced by a certain number of vibrations. The tone produced by double this number of vibrations will be in unison with it, though higher in pitch. Between these two notes are several other notes at different intervals of pitch, forming together a series more agreeable than any other. This series is known as the *diatonic scale.* There are eight of these tones, including the first and last. The interval between the first and last tones is therefore called an *octave,* and the intervals between the first and the second, the first and the third, the first and the fourth, etc., respectively, are known as a second, a third, a fourth, etc. Each of the tones of the diatonic scale is given a name, to denote its absolute pitch, that is, its number of vibrations. These are the letters of the alphabet, beginning with A. The scale may be extended up or down, so long as the sounds continue to be musical, that is, so long as the additional tones are in the same relation, as to number of vibrations, as those of the original scale. The tone upon which the scale begins is said to be the *keynote,* or *tonic,* of the scale, and the letter which represents this tone is the name of the key upon which the scale is written. The fundamental key is the key of C. The following table shows the scale of C through one octave, with the number of vibrations which produce each of these tones, relative to the number which produces C, which is taken as 24 (middle C is in reality 256); also the names by which the tones of any scale, regardless of key, are called, in order:

C	D	E	F	G	A	B	C
24	27	30	32	36	40	45	48
do	re	mi	fa	sol	la	ti	do

It is evident that if a scale is begun with the tone of E, the order of the intervals of the scale will not be in the order of the diatonic scale as given above. On most stringed instruments it is possible to produce the correct order by shortening and lengthening the vibrating string, as required. But on keyed instruments, such as the piano, this is impossible, and to obviate the difficulty a few intermediate tones are represented on the keyboard by black keys, known as the *sharp* and *flat* keys. These are placed at such intervals that a scale may be begun on any tone, and, by the proper insertion of the tones represented by the black keys, approximately the proper intervals in order may be produced. However, to do this absolutely, a vast number of keys would have to be inserted, so that in the pianoforte no key is usually absolutely correct. This accounts for the fact that violin music, in which the intervals of a scale can be more closely regulated, is more agreeable to the thorough musician than piano music.

Besides the forms of the diatonic scale, which has an interval of two tones between the keynote and the third and is called the *major* scale, there are so-called *minor* scales, of which the most important kind, known as the *harmonic minor,* has an interval of a tone and a semitone between its tonic and its third and has the seventh note *sharped,* or raised a part of a tone, in the ascending scale. Another form of minor avoids the harsh interval between the sixth and the seventh tones by sharping the sixth tone. This is known as a *melodic minor.* In both forms the sharps are removed in descending, and the scale is identical with the major, beginning at the sixth tone. The minor which begins upon the sixth tone of a certain major scale is said to be a *relative minor* of that major scale. Thus, the scale of E minor is relative to the major scale of G and the relative minor of the major scale of C is A minor.

NOTATION. Every sound employed in the art of music may be represented by a character, called a *note,* written on a *staff,* that is, five equidistant horizontal lines. A note represents a higher or a lower sound, according as it is placed higher or lower on this staff. When a note is higher or lower in pitch than any which can be placed upon the staff, short lines, called *ledger lines,* are added above or below the staff, to indicate the relation of the note to those written on the staff. Since the addition of numerous ledger lines is liable to confuse the eye, composers have made use of several staffs, of which the most common are the *bass* and the *treble,* the former containing the lower notes. Each line and space of the staff corresponds to a note in the diatonic scale. Each line and space is therefore given a name corresponding to the name of the note for which it stands. The lines and spaces of the treble staff, beginning with the lower line and named in order, are E, F, G, A, B, C, D, E, F. In the writing of music upon the staff, in order to represent scales having any other keynote than C, it is necessary to have symbols to represent the semitones as mentioned above, called *sharps* and *flats.* The sharp (♯), placed before a note, raises the pitch by a semitone; a flat (♭) lowers it by a semitone. A sharp or flat placed at the beginning of a staff affects every note upon the line on which it is situated. A *natural* (♮) is placed before a note to restore it to its normal or natural pitch, but it acts only through the measure in which it is situated.

In the writing of music, each note upon the staff represents not only the pitch of the tone which it represents, but also the duration of the sound; this is always dependent upon the so-called *time* in which the composition is written. Every piece of music is divided into portions which are to be performed in equal spaces of time. These are called *measures* and are separated from each other, in writing, by vertical lines, called *bars.* The fixed standard of time length of the notes is a whole note (𝅝). This is divided into half notes, quarter notes, eighth notes, sixteenth notes, etc. Of these a certain number, or their equivalents, are to be used in each measure. At the beginning of every composition is the so-called *time signature.* This does not tell the absolute time to be consumed in the performance of a measure, but indicates, rather, the number of beats or units of rhythm which are to be marked off during its performance, these beats coming at equal intervals of time. The most common signatures are the following: $\frac{4}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{3}{8}$, $\frac{6}{8}$, $\frac{8}{8}$, $\frac{2}{2}$. In each of these, the upper number represents the number of beats to the measure, the lower represents the time value of each beat, that is, the kind of notes which form the units of time in each measure, or the time length of each unit note relative to the standard whole note. The rate of speed is regulated by the performer or composer. Custom has decreed that compositions written with half or whole notes as unit notes be performed in slow, stately time, representative of dignity or reverence, and those written with smaller fractional notes as units be given in faster time, indicative of gaiety or emotion. Besides the notes on the lines and spaces of the staff, other signs are used to indicate the duration of the sounds. A dot placed after a note lengthens it by one half; a curve placed over two notes on the same degree of the staff indicates that they are to be played as one and prolonged to the duration indicated by the two notes together. This is called a *tie*. When an interval of time is to occur between the sounding of two notes, a *rest* is introduced, notes of every time value having corresponding symbols for rests.

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HISTORY. The history of music is naturally divided into two great periods, ancient and modern, distinguished by two facts: the ancients knew nothing of harmony, that is, of the results produced by sounding several notes together; they also knew nothing of a key. The oldest records of music are those of ancient Egypt, dating to about 4000 B. C., but the representations that have been found of the crude cymbals, drums, flutes and harps show conclusively that little progress had been made up to that time. Among the Hebrews and Assyrians the important phase of music was its religious significance, for it never attained among them to the dignity of an art.

In India there are indications that the art of music had made some progress even in early times, but it was left for the Greeks to give the first great impetus to the study. Their music was inseparably linked with poetry. It consisted of a "sort of rhythmic diction," accompanied by coarse instruments, whose chief purpose was to accentuate the rhythm. That part of such a performance which we would call *music*, they distinguished by the name *harmony*. The Greeks also made the first systematic attempt to produce a system of permanent notation. The principal instrument among the Greeks was the lyre, later called the cythara. The Romans added little to the knowledge of musical art or science, but to them is due the construction of the first organ and the bagpipe.

The next epoch in the history of music begins with the rise of Christianity, the first great name being that of Gregory the Great, to whom is due the Gregorian chant, still used in the Roman Catholic Church. After the time of Charlemagne, when the Saracens gained a foothold in southern France, their simple, emotional spirit became a lasting influence upon Western music. Somewhat later, in the North, the development of minstrelsy among the Celts and Saxons became an important force, keeping alive the love of music and carrying from place to place the best that was known. Writers of music became more numerous at this time; the monk Hucbald suggested counterpoint (See COUNTERPOINT) and the use of the staff in notation. Adam de la Halle composed a work similar to light opera and developed the idea of harmony, while Guido d'Arezzo practically produced modern notation.

In the sixteenth century another revival took place, and among the names of musical importance of that time are Martin Luther, to whom the Christian Church is indebted for many beautiful chorals, and Palestrina, probably the greatest musical genius in Italian history. Shortly after, the first real opera was produced by Peri, who was followed by Monteverde, who gave to music the touch of imagination and ardor which it needed to bring it to popular esteem. Meantime, the construction of musical instruments was progressing; the violin, organ and clavichord were being perfected, and musicians were appearing to play upon them. From this time, then, all the elements requisite for growth were present—a knowledge of harmony, a musical notation, a diversity of instruments, and enthusiasm.

At this point its history separates into national channels, corresponding to the national spirit which was beginning to pervade literature and politics. The German school was characterized by its scientific accuracy, large themes and powerful use of instruments (See articles under the names of the leading German musicians, as shows the scale of C through one octave, with the number of vibrations which produce each of these tones, relative to the number which produces C, which is taken as 24 (middle C is in reality 256); also the names by which the tones of any scale, regardless of key, are called, in order:

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In the writing of music, each note upon the staff represents not only the pitch of the tone which it represents, but also the duration of the sound; this is always dependent upon the so-called *time* in which the composition is written. Every piece of music is divided into portions which are to be performed in equal spaces of time. These are called *measures* and are separated from each other, in writing, by vertical lines, called *bars*. The fixed standard of time length of the notes is a whole note (𝅝). This is divided into half notes, quarter notes, eighth notes, sixteenth notes, etc. Of these a certain number, or their equivalents, are to be used in each measure. At the beginning of every composition is the so-called *time signature*. This does not tell the absolute time to be consumed in the performance of a measure, but indicates, rather, the number of beats or units of rhythm which are to be marked off during its performance, these beats coming at equal intervals of time. The most common signatures are the following: $\frac{4}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{3}{8}$, $\frac{6}{8}$, $\frac{8}{8}$, $\frac{2}{2}$. In each of these, the upper number represents the number of beats to the measure, the lower represents the time value of each beat, that is, the kind of notes which form the units of time in each measure, or the time length of each unit note relative to the standard whole note. The rate of speed is regulated by the performer or composer. Custom has decreed that compositions written with half or whole notes as unit notes be performed in slow, stately time, representative of dignity or reverence, and those written with smaller fractional notes as units be given in faster time, indicative of gaiety or emotion. Besides the notes on the lines and spaces of the staff, other signs are used to indicate the duration of the sounds. A dot placed after a note lengthens it by one half; a curve placed over two notes on the same degree of the staff indicates that they are to be played as one and prolonged to the duration indicated by the two notes together. This is called a *tie*. When an interval of time is to occur between the sounding of two notes, a *rest* is introduced, notes of every time value having corresponding symbols for rests.

Besides the pitch and duration of tones, the quality and intensity may be indicated in a musical composition by certain symbols, usually Italian words, of which the most common are, perhaps, *forte* (loud), *fortissimo* (very loud), *piano* (soft) and *pianissimo* (very soft). A large number of other phrases, indicating the emotion which the music is intended to arouse and the consequent quality of the tones which should represent the music, are used in every composition.

History. The history of music is naturally divided into two great periods, ancient and modern, distinguished by two facts: the ancients knew nothing of harmony, that is, of the results produced by sounding several notes together; they also knew nothing of a key. The oldest records of music are those of ancient Egypt, dating to about 4000 B. C., but the representations that have been found of the crude cymbals, drums, flutes and harps show conclusively that little progress had been made up to that time. Among the Hebrews and Assyrians the important phase of music was its religious significance, for it never attained among them to the dignity of an art.

In India there are indications that the art of music had made some progress even in early times, but it was left for the Greeks to give the first great impetus to the study. Their music was inseparably linked with poetry. It consisted of a "sort of rhythmic diction," accompanied by coarse instruments, whose chief purpose was to accentuate the rhythm. That part of such a performance which we would call *music*, they distinguished by the name *harmony*. The Greeks also made the first systematic attempt to produce a system of permanent notation. The principal instrument among the Greeks was the lyre, later called the cythara. The Romans added little to the knowledge of musical art or science, but to them is due the construction of the first organ and the bagpipe.

The next epoch in the history of music begins with the rise of Christianity, the first great name being that of Gregory the Great, to whom is due the Gregorian chant, still used in the Roman Catholic Church. After the time of Charlemagne, when the Saracens gained a foothold in southern France, their simple, emotional spirit became a lasting influence upon Western music. Somewhat later, in the North, the development of minstrelsy among the Celts and Saxons became an important force, keeping alive the love of music and carrying from place to place the best that was known. Writers of music became more numerous at this time; the monk Hucbald suggested counterpoint (See Counterpoint) and the use of the staff in notation. Adam de la Halle composed a work similar to light opera and developed the idea of harmony, while Guido d'Arezzo practically produced modern notation.

In the sixteenth century another revival took place, and among the names of musical importance of that time are Martin Luther, to whom the Christian Church is indebted for many beautiful chorals, and Palestrina, probably the greatest musical genius in Italian history. Shortly after, the first real opera was produced by Peri, who was followed by Monteverde, who gave to music the touch of imagination and ardor which it needed to bring it to popular esteem. Meantime, the construction of musical instruments was progressing; the violin, organ and clavichord were being perfected, and musicians were appearing to play upon them. From this time, then, all the elements requisite for growth were present—a knowledge of harmony, a musical notation, a diversity of instruments, and enthusiasm.

At this point its history separates into national channels, corresponding to the national spirit which was beginning to pervade literature and politics. The German school was characterized by its scientific accuracy, large themes and powerful use of instruments (See articles under the names of the leading German musicians, as

BACH; HANDEL; MOZART; BEETHOVEN; SCHUBERT; WAGNER); the Italians sought for beauty, purity and striking melody (See articles upon Italian musicians, as ROSSINI; DONIZETTI; BELLINI; VERDI); the French musicians sought to express strong, truthful emotion (See GLUCK; AUBER; BERLIOZ; GOUNOD; BIZET; SAINT-SAENS), the Russian school is notable for its picturesque, melodious and striking themes (See RUBINSTEIN; TSCHAIKOWSKY; PADEREWSKI; MOSZKOWSKI); the Scandinavians have tended to produce music of a stirring, patriotic character, with emphasis rather upon rhythm than upon melody (See GADE; GRIEG); the same may be said of the Bohemian school (See DVORAK; SMETANA). England's musical history, which may be said to have reached its height at the time of Handel, who spent some years in England, has never since attained the same brilliance, and its music is even now rather a composite than an expression of a national spirit and theme (See BALFE; MACFARREN; SULLIVAN; BARNBY; COLERIDGE-TAYLOR). American music has until lately been of little importance, but within recent years a number of composers have appeared who have attained international fame (See CHADWICK; MACDOWELL; DAMROSCH; THOMAS; SEIDL; SHELLEY; DE KOVEN).

See special articles upon the great musical artists, as JOACHIM; MALIBRAN; PATTI; PAGANINI; CHERUBINI; DE RESZKE, EDOUARD; DE RESZKE, JEAN; SOUSA; NORDICA; REMENYI; GUILMANT; SCHUMANN-HEINK; KUBELIK; BULL, and others. Also consult articles on ORCHESTRA; BAND; OPERA; HARMONICS; ORATORIO, and the special articles therein referred to; also articles on the principal musical instruments.

Consult Henderson's *How Music Developed*, Krehbiel's *How to Listen to Music*, Mathews's *A Popular History of Music* and Sarah Tytler's *Musical Composers and Their Works*.

Musical Instruments. See MUSIC, also articles upon the several musical instruments, such as DRUM; CORNET; VIOLIN; PIANOFORTE; ORGAN.

Musk, a substance obtained from several species of deer and used in perfumery and medicine. A perfume of similar character is also obtained from one or two other animals. Musk is very valuable because of its scarcity. and it is therefore much adulterated in the markets, and many substitutes are sold in place of it. See MUSK DEER.

Muskat, *mus kaht'*, or **Maskat,** *mahs kaht'*. See MUSCAT.

Musk Deer, a genus of deer which is essentially distinct from the true deer. They live chiefly in Asia and the islands of the Eastern Archipelago, though one species is found on the west coast of Africa. These animals attain the size of a young roedeer. The males alone yield the musk. The Tibet musk is most in repute, that known as Russian or Siberian being inferior in quality. Besides its familiar use as a scent, musk is employed medicinally.

Muske'gon, MICH., the county-seat of Muskegon co., 40 mi. n. w. of Grand Rapids, on Muskegon Lake, connected with Lake Michigan by a channel 200 feet wide, and on the Grand Trunk, the Pere Marquette and other railroads. The city has an excellent harbor, conducts a large trade in lumber, fruit, celery and other garden truck and contains lumber, flour, paper and knitting mills and furniture, piano and other factories. The city has a manual training school, a public library, a gymnasium, a hospital and a public square containing a soldiers' monument, all of which are gifts of a prominent business man of the city. Muskegon was settled in 1834 and was chartered as a city in 1869. Population in 1904, 20,897.

Mus'ket, a hand gun with which infantry soldiers were formerly armed. When first introduced, early in the sixteenth century, as a development of the culverin and arquebus, it was discharged by means of a lighted match and was so heavy that in firing it had to be laid across a staff, or *rest*. The wheel lock followed, the chief feature of which was a wheel made to revolve by means of a spring and to cause sparks by friction against a flint. The next improvement was the flintlock proper, in which sparks were produced by one impact of a piece of flint on the steel above the priming powder. Musketeers were soon introduced into all armies, and in the beginning of the seventeenth century infantry consisted of pikemen and musketeers, and all changes in regard to the relative proportion of the two arms were always in favor of the latter. The flintlock musket was introduced into the British army toward the end of the seventeenth century and was the British musket of the days of the Peninsular War and Waterloo, known familiarly as "Brown Bess." It was superseded by the percussion musket in 1842, this musket being in turn superseded by the rifle.

Muskhogean, *mus ko' ge an*, **Indians** (swamp dwellers), a great family of indian tribes which formerly lived along the Atlantic coast, south of Tennessee, and the remnants of which now live in Oklahoma. It was an extensive family that varied greatly in different sections of the country. No other indians have proved so intelligent or made such progress in agriculture as have the members of this great family, which was in fact the most advanced of the eastern tribes, even at the time of the discovery of America. The tall and active Creek and the shorter, thickset Choctaw are the two chief types. Their system of government was elaborate and interesting, each tribe living in a village by itself. The western tribes flattened the skulls of their children, and in all tribes they were deformed in some way. See Chickasaw; Choctaw; Creeks; Seminole.

Muskin'gum, a river in the State of Ohio, formed by the union of the Walhonding and the Tuscarawas. It falls into the Ohio River at Marietta, after a course of about 120 miles, and is connected with Lake Erie by canal.

Musk'melon. See Melon.

Musk Ox, an animal related to both the ox and sheep, so named because of its musky odor. Resembling in general appearance a large, goat-like sheep, its body is covered with a coat of tufted hair, brownish in color and of great length. The hair about the neck and shoulders is so thick as to give the animal a humped appearance; on the rest of the body it is very long, smooth and flowing, while interspersed among its fibers is a layer of lighter-colored wool. The musk ox is active and agile and climbs mountainous places with ease and dexterity. The horns, broad at the base, and covering the forehead and crown, curve downward between the eye and the ear and then upward and slightly backward. The ears are short; the head, large and broad; the muzzle, blunted. Gregarious in habits, each herd numbers from twenty to thirty members. The food consists of grass, lichens and herbs. The musk ox inhabits the Arctic regions of America, though formerly it was often found in northern parts of the United States, as well as in northern Europe and Asia. The flesh is pleasant to the taste, though it smells strongly of musk.

MUSK OX

Musk'rat, also called *musquash,* a rodent related to the field mouse. It is about the size of a small rabbit and has a tail about 10 inches long. It lives usually in streams and moist places, where it burrows in the bank or builds houses of sticks and rushes. It is of considerable commercial importance, on account of its fur, which in commerce is known as river sable. The muskrat has a strong musk odor; hence its name. Different small animals in other countries have been given the same name because of their odor, notably the rat-like *shrew* of India.

MUSKRAT

Muskwaki, *musk wah'ke.* See Fox (indians).

Muslin, *muz'lin,* a fine cotton fabric, woven plain, similar to calico, but less compact. It was first made in Mosul, Mesopotamia, whence its name; afterwards it was produced in India, and it was first imported into England about 1670. The common muslins to-day are manufactured in France, England and America.

Mus'sel, a term popularly given to several different mollusks. The common mussel is found in the temperate sea waters of Europe and the United States, and in some districts it

COMMON EUROPEAN MUSSEL

is used as an article of food, the best approaching somewhat to the oyster in flavor, though occasionally found to be unwholesome.

Musset, *mü sa′,* ALFRED DE (1810–1857), a French poet, novelist and dramatist. After his graduation from college, he gave himself up wholly to literature, and in 1830 he published a volume of poems which had an immediate and striking success. Besides the volumes of poems, on which his fame chiefly rests, he wrote novels and dramas. De Musset was one of the most distinctive and, in a certain sense, original, of modern French poets.

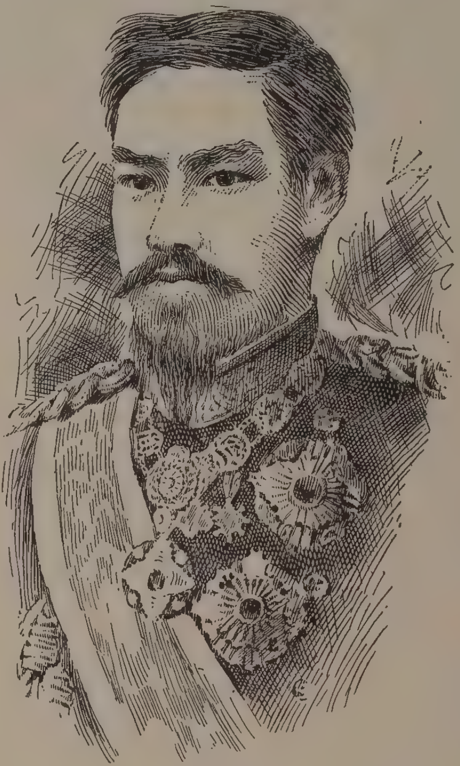
Mustagh, *moo stahg′,* **Mountains.** See KARAKORUM.

Mus′tard, the common name of several plants of the mustard family (See MUSTARD FAMILY). The seeds of the white and common mustard, when ground and freed from husks, form the well-known condiment used at the table. The plant is an annual, with stems three to four feet in height, the lower leaves lyrate, the upper narrow and entire. The flowers are small and yellow.

Mustard Family or **Cruciferae,** an extensive order of plants, containing about 1600 known species, consisting of herbs, most of which have flowers with six stamens (two of which are short) and four sepals and petals, which spread so as to resemble a Maltese cross. The fruit is a pod divided into two cells. Many species, such as cabbage, turnip and horseradish, are cultivated for food or relishes, while others furnish important medicines and beautiful flowers. See MUSTARD; CRESS; TURNIP; CABBAGE; RADISH; HORSE-RADISH.

Mu′tiny Act, an act passed by the British Parliament each year, granting to the crown the power to regulate the army and the navy. According to the Bill of Rights, the maintenance of a standing army in time of peace is illegal; hence Parliament is compelled to pass a law each year, fixing the strength of the army and determining the cost of its maintenance. But English courts have decided that in spite of Parliament's establishment and maintenance of an army, the king has no power to punish a mutinous soldier in time of peace. Parliament was again compelled to pass a law, annually granting to the Crown this right. In 1879 this, the so-called Mutiny Act, and the other law referred to, known as the Articles of War, were consolidated, and since that time they have been passed each year as one bill, known as the Army Act.

Mutsuhito, *müt sü he′to,* (1852–), emperor of Japan. He ascended the throne in 1867 and inaugurated a liberal reform policy, including the adoption of a constitution. During his reign European influence and ideals have become firmly established in Japan, but it is not known what part the emperor took in the change. The chief events of his reign have been the war with China and the war with Russia.



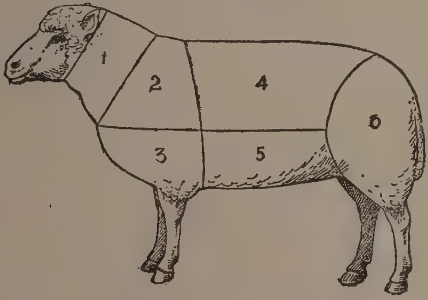
MUTSUHITO

Mut′ton, the flesh of sheep. Mutton is a nutritious and wholesome meat, having a delicate flavor, and is highly prized as an article of food. Most of the mutton placed on our markets is prepared in the packing houses. After dressing, the carcass is given time to cool and "ripen," when it is ready for market. The carcass is sold to the retail dealer whole, and he usually cuts it according to the diagram. (See illustration on next page.) Large quantities of mutton are exported from Australia and New Zealand to England. The meat is frozen before exporting and is sent in refrigerator ships. See MEAT PACKING; SHEEP.

Mycenae, *mi se′ne,* an ancient city of Greece, in the Peloponnesus, about 6 mi. n. e. of Argos.

It is said to have been founded by Perseus and to have been the residence, before the Trojan War, of Agammenon, in whose reign it was regarded as the leading city of Greece. Its ruins are extremely interesting, especially the Lion Gate and the vaulted building of enormous stones, known as the Treasury of Atreus. Doctor Schliemann carried on excavations here with most valuable results. See SCHLIEMANN, HEINRICH.

Myo′pia, a deformity of the eye, caused by the lengthening of the diameter of the eyeball from front to back. This is usually produced by too great a curvature of the cornea, or crystalline lens. Rays of light entering an eye thus deformed are brought to a focus in front of the retina, causing indistinctness of vision. Persons afflicted with myopia are said to be *near-sighted* or *short-sighted.* The defect is remedied by spectacles with concave lenses. See EYE; SPECTACLES.



MEAT CUTS FROM A SHEEP
1, neck; 2, chuck; 3, shoulder; 4, loin; 5, flank; 6, leg.

Myr′iap′oda, a group of animals resembling worms, in that they have long, slender bodies, which, however, are divided into many rings, rarely less than twenty-four, nearly equal in size and each bearing legs. The legs of some species are very numerous and resemble bristles, but in the higher forms they are jointed, like those of insects (See CENTIPEDE). Formerly these animals were classed with the insects, which they resemble very closely in their larval state, but they now are considered a distinct group of the jointed animals (See ARTHROPODA). Myriapods are generally found in dark, moist places, under logs and in cellars. Some are too small to be seen with the naked eye, but others are many inches long. Some species secrete sharp, burning fluids that protect them from their enemies, and others are armed with poison fangs.

Myr′midons, an ancient Greek people of Thessaly, who accompanied Achilles to the Trojan War. They are said to have emigrated into Thessaly under the leadership of Peleus. The term has come to signify the followers of a daring and unscrupulous leader, or the harsh and unfeeling agents of a tyrannical power.

Myrrh, *mur,* the name given to a gum resin which exudes from a shrub growing in Arabia and Abyssinia. It has been long used as a perfume, for incense and as a medicine. Myrrh of the best quality is known as Turkey myrrh.

Myrtle, *mur′t′l,* a genus of plants, consisting of aromatic trees or shrubs, with simple opposite leaves, which are sprinkled with glandular points. The flowers are rose-colored or white. Cloves, allspice and Brazil nuts are produced by members of this family. The *common myrtle* is a native of the south of Europe and other countries bordering on the Mediterranean. It has been celebrated from remote antiquity on account of its fragrance and the beauty of its evergreen foliage, and by different nations it was consecrated to various religious purposes. The brows of victors in intellectual contests were adorned with myrtle wreaths, and at Athens myrtle was an emblem of civic authority. The running plant known as myrtle in the United States is of a different family and should be called *periwinkle.*

Mysore, *mi sore′,* or **Maisur,** *mi soor′,* a city of India, the capital of the native state of the same name, 245 mi. s. w. of Madras and 10 mi. s. w. of Seringapatam. The town is well built, with regular streets and a number of interesting buildings, among which are the maharaja's palace and the residency. Carpet weaving is the leading industry. Population in 1900, 68,111.

Mys′teries, among the ancient Greeks, and afterward, also, among the Romans, secret religious assemblies which no uninitiated person was permitted to approach. They originated at a very early period and seem to have had a double object—first, that of handing down the traditions relating to the divinities in whose honor they were celebrated; and secondly, that of teaching and practicing religious rites. The most important Greek mysteries were: 1, The *Eleusinian.* 2, The *Samothracian,* celebrated in honor of the Cabiri. 3, The *Dionysia,* which were celebrated in honor of Bacchus or Dionysus. These were of so immoral a character that they were latterly forbidden as prejudicial to the public peace and morals. The Roman senate in 166 B. C. also forbade them. 4, The *Orphic,* founded by some who called themselves followers of Orpheus.

Mystery, a kind of rude drama, which was a favorite spectacle in the Middle Ages and which was presented at solemn festivals. The subjects were of a religious character, and the monks were at first the performers and authors, the performance being in church. Such plays were called *mysteries* because they taught the mysterious doctrines of Christianity. They represented scenes from Scripture history, being thus distinct from the *miracle* plays, which dealt with lives of saints, though the distinction is not always observed. The mystery plays were one of the methods employed to give instruction to the people in religious matters and to strengthen the influence of the Church. In later times these plays were usually exhibited in a connected series by the guilds of a town, and it sometimes took several days to perform a series. Thus, we hear of one which lasted eight days and contained the greater part of the Scripture history, beginning with the creation and ending with the judgment day. The *Passion of Christ*, the *Slaughter of the Innocents*, *the Creation of the World* and the *Fall of Man* were among the subjects represented, the first perhaps more frequently than any other. Corpus Christi day was the chief occasion on which they were performed. Mysteries continued to be given from the twelfth to the sixteenth century. Such plays are still given at various places in Roman Catholic countries. The passion play performed at the village of Oberammergau, in Bavaria, every ten years, is a play of this kind. The mysteries were superseded by the moralities. See MIRACLE PLAY; MORALITY.

Mysticism, *mis'ti siz'm*, the name given to a condition of mind in which one believes himself to have merged his individuality in that of God; also, to the philosophical and religious theories based upon this conception. Mysticism is of ancient origin, and several important systems of thought and religion have been based upon it. Among these are Buddhism, Brahmanism and several forms of Christian theology.

Mythology, *mith ol'o jy*, the collective name given to the body of fables, legends or myths which grow up in almost all primitive nations regarding the creation of the world, the origin of man, the powers of nature and the adventures of the gods and heroes. It is natural that in the savage mind such questions should arise as What is the world? What is man? Who made them? Whence came all the natural objects about us? What causes the changes from light to darkness, from heat to cold, from life to death? The attempts to answer satisfactorily these questions give rise to a certain body of stories, which are known as *explanatory myths.* Other groups of stories which do not explain, which have no obvious aim beyond that of mere entertainment, which consist in tales of the adventures of gods and heroes, are called *aesthetic myths.*

ORIGIN. Much time has been spent, especially of recent years, in the study of mythologies with a view to discovering their meaning, the way in which they arose and their interrelation. Most attention has been given to the myths of the Greeks and Romans, the Egyptians, the Norsemen and the Hindus. For the great similarity which is found in many of the myths of these different peoples, various explanations have been advanced. One is that all of these peoples had a common ancestry and that their myths and legends date back to the ages before the separation took place. Another, and on the whole more satisfactory, explanation is that with the same primitive surroundings the same questions are likely to arise and similar explanations are likely to be made. Another question regarding the myths, that as to the method of their origin, has also been answered in various ways. One is that the gods and demigods treated of were originally merely men who were remembered after death for their famous achievements and who came in time to be regarded as more than human. A second theory is that wise men invented those myths in which the gods appear as good and just and beneficent, for the purpose of establishing law among communities through a wholesome reverence for higher powers. This view necessitates the conclusion that the myths in which the gods are represented as capricious, unjust and immoral were later inventions of poets or storytellers. Still another view is that all myths were originally the explanation of physical phenomena, but that many of them have lost their original significance. (For a general account of this subject of the growth and explanation of myths, see Gayley's *Classic Myths in English Literature*).

GRECIAN AND ROMAN MYTHOLOGY. These may well be treated together, since the accounts of the creation are practically identical with the two peoples, and since the Grecian gods, with their attributes and legends, were to a large extent adopted by the Romans. The explanation given in classic mythology of the beginning of all things is that in the beginning there was a vast abyss, known as Chaos. There arose first

Earth (Gaea) and love, and from these came heaven and the mountains, the seas, the fields, the animals and vegetation. Of Chaos were born Erebus and Nox (night), and from these in turn sprang light and day. The Titans, children of Uranus (heaven) and Gaea, were twelve in number, and by one of these Titans, Saturn, Uranus was at length dethroned. Saturn, with Rhea, his sister and wife, reigned for a time supreme, until he in turn was dethroned by Jupiter, his youngest son. Jupiter divided the universe by lot, he himself receiving the earth and the heavens, Neptune the sea, and Pluto, Hades, the lower world. Jupiter was supreme, however, over his two brothers and over all the other great gods, of many of whom he was the father. Juno, his sister and wife, was the queen of heaven. The great gods who dwelt on Olympus were Jupiter, Juno, Minerva, Mars, Vulcan, Apollo, Diana, Venus, Mercury and Vesta. Ceres, who was a sister of Jupiter, usually had her abode on earth. The lesser deities were very numerous, and they were regarded as inhabiting the woods, the sea and the mountains. Another question to be accounted for was the creation of man. The explanation of this was that he had been made out of stones or grew from trees, or that Prometheus, a Titan, molded man out of clay in the image of the gods. During the Golden Age, which was believed to correspond with the rule of Saturn, men lived in perfect innocence, but as greed, hatred and lust grew up among them, their state became so bad that Jupiter was finally obliged to send a flood which wiped from the earth all human beings except Deucalion and Pyrrha, who had always been just servants of the gods. A more detailed knowledge of the myths of Greece and Rome may be gained by reading the articles on the personages mentioned above.

Scandinavian or Northern Mythology. This is the name given to the body of myths which in its earliest forms was common to all the Teutonic nations, to the Germans and Scandinavians, as well as to the ancestors of the English. The legends tell that in the beginning there was no world, but only a vast abyss, to the north of which was mist and to the south of which was light. Twelve rivers had their sources in the mist world, and these flowed into the great abyss, where they were frozen. The warmth from the light world melted this ice, and from the mist which arose came Ymir, regarded as the father of the giants, and the cow Adhumbla. The giant was nourished by the cow's milk, and the cow by the salt which she licked from the ice. One day, while she was thus feeding, human hair appeared above the ice; the next day a head came into view, and shortly after the god Bori appeared. From Bori all the gods were descended. Odin and his two brothers, the grandsons of Bori, killed the giant Ymir and of him they formed the earth, making the solid ground from his flesh, the ocean from his blood, the rocks from his bones, the forests from his hair, the clouds from his brains and the canopy of heaven from his great skull. The great gods, known as the *Aesir*, were twelve in number, and the goddesses were twenty-four in number. These immortals lived in a realm known as Asgard, regarded as some place above the earth. The most of the gods were beneficent in their dealings with man, and in northern mythology there are fewer stories showing the gods as cruel and licentious than there are in the classical myths. Lok, the god of evil, was at first considered not so much the personification of evil as of mere mischievousness. As time went on, however, the conception of him changed, and he came to correspond closely with the Satan of the Christian religion. Men, according to the northern mythology, were created from trees. In the beginning they lived in perfect innocence and goodness, but with the advent of Lok on earth and with the entrance of the giants into various relations with men, the age of innocence came to an end, and gods and men were involved in a struggle for existence with the powers of evil. One distinctive point of the northern mythology was the belief that a time known as Ragnarök (the Twilight of the Gods) would come, when the rule of Odin and his fellow gods would come to an end, when the powers of evil would triumph, when Asgard with its palaces would be destroyed. They believed, however, that out of the destruction of the old order of things would arise a new heaven and a new earth and that peace and happiness would once more reign. See Balder; Freya; Frigga; Heimdall; Lok; Odin; Thor; Tyr.

Egyptian Mythology differed from that of the Greeks and Romans and the northern people in that it consisted, originally, not in a general or national religion, but in a number of religions which grew up in separate towns and villages. Naturally, as some of the cities increased in importance and gained control of others, the stronger ones were able to force their religions upon the weaker, so that as time went on the gods became fewer and attained importance among a larger number of worshipers. There was never, however, in Egypt a complete fusion of the different religions. One of the distinctive beliefs of the Egyptians was that the soul of man was immortal. All the Egyptian religions united in this belief, although there was a great difference of opinion as to where and in what state the soul lived after death. See AMMON; APIS; ISIS; RE; OSIRIS; Serapis.

Consult Guerber's *Myths of Greece and Rome* and *Myths of Northern Lands*; also Bulfinch's *The Age of Fable.*

N

N, the fourteenth letter of the English alphabet, in its form derived, with practically no change, from the Phoenician alphabet. Its value, also, has been the same from the earliest time. In English and most other languages, *n* has a pure nasal sound, and it is much the commonest of the nasals. In a few words, after *m* and *l*, it is silent, as in *hymn, kiln*; and in many words it has, in unaccented syllables, the force of a vowel, as in *open, chosen.*

The commonest use of *n* as an abbreviation is for *north.*

Nab′opolas′sar, a Babylonian king, the founder of the New Babylonian Empire. He was not of royal family, but rose to great power in Chaldea, to the south of Babylon, and succeeded in extending his power to Babylon in 626 B. C. Later, about 606 B. C., he took Nineveh, which he destroyed. The city of Babylon owed much to him. He died about 605 B.C.

Nagasaki, *nah′ga sah′ke,* a city and port in Japan, capital of the prefecture of the same name, on the west coast of the island of Kiushiu, beautifully situated on a peninsula and enclosed by hills, upon the sides of which a portion of the town is built. The harbor is excellent and the trade very large. Nagasaki was one of the five Japanese ports opened in 1858 to the British and Americans, and eleven years later it was opened to foreign nations generally. The chief exports are copper, silk, camphor, tobacco, porcelain, lacquered wares and sugar. Population in 1904, 153,293.

Nogo′ya, a city of Japan, situated on the island of Hondo, 170 mi. W. S. W. of Tokyo, and on the Bay of Owari. The city is well built and contains many temples and monasteries, also a castle. Its industries include the manufacture of porcelain, lacquered ware, enameled ware, fans, embroideries, cottons and silks. It is one of the most important cities on the island. Population in 1904, 288,639.

Na′hum, one of the twelve minor prophets, the author of a book in the Old Testament. His prophecies relate to the destruction of Nineveh, which he describes in vivid colors. The period in which he lived is uncertain, but it was probably between 700 and 600 B. C.

Naiads, *na′yadz,* in Greek mythology, nymphs of fountains and brooks, of similar character to the dryads and resembling the nixies of the northern mythology.

Nails, small, slender pieces of metal, generally with round or flattened heads, used for driving into timber or other material for the purpose of holding separate pieces together. There are so many kinds and sizes that a list of them all would fill a considerable space. The kinds in most common use are wrought, cut, wire, horseshoe and shoe nails. *Wrought nails* were formerly made by hammering them from a small bar of iron or steel called a *nail rod.* For centuries this was the only method of nail making known, and thousands of men, women and children in and around Birmingham, England, were engaged in the work. Now all nails are made by machinery.

Many patterns of nail-making machines are now in use, and the process of manufacture has been so cheapened that the price of nails is much less than formerly. *Cut nails* are made by rolling the iron into flat bars, which are a little wider than the nail is long, and of the same thickness. These bars, called *nail plates,* are fed into a machine, which cuts the nail, then seizes it in a vice-like arrangement and strikes it a sharp blow with a die, which forms the head. By an ingenious device, the plate is usually fed into the machine so as to have the wide part of the nail cut from the two edges alternately; in this way waste of iron is prevented.

Wire nails are now in use for most purposes. They are made from steel wire which is prepared especially for the purpose (See WIRE). The work is all done by machinery. The wire is wound on a reel; one end of it is fed into a nail machine, which cuts the nail, points it and makes the head automatically. A single machine will make from one hundred fifty to five hundred nails a minute, depending on the size, the large nails requiring more time than the small ones. Half a million tons of wire are made into nails in the United States each year.

The size of nails is denoted by the term *penny*; as, six-penny and eight-penny. The word penny in this sense means pound, and the term indicates the number of pounds that a thousand nails of that size will weigh; as, one thousand six-penny nails will weigh six pounds. Very large nails are called *spikes*, and very small ones, *brads* or *tacks*, according to the shape.

Nails, of animals, are a form of the outer layer of the skin. In man the nails do not enclose the ends of the fingers and toes, but in the horse and other animals the nails assume the form of protective coverings and are then known as "hoofs." Nails may be produced to form "claws," as in birds and flesh-eating animals, while in the sloths they are large enough to aid in climbing trees. The human nails consist of a root, which is hidden below the skin, and an exposed part, which is attached to the skin. Both are produced from the true skin. They grow in length about one-thirtieth of an inch in a week on the fingers and more slowly on the toes. If a nail be removed by accident, it will grow again, provided the cells which secreted it have not been injured. The light spot at the base of the nail is called the *lunula*.

Namaqualand, *na mah'kwa land*, GREAT. See GERMAN SOUTHWEST AFRICA.

Names, PERSONAL. It is probable that at first all names were significant. Old Testament names are almost all original; that is, they were given in the first instance to the individuals bearing them. They either originated in some circumstance of birth or expressed some religious sentiment, thus: Jacob (supplanter), Isaiah (salvation of Jehovah), Hannah (favor), Deborah (bee). When some important change occurred in a man's life, his name was often changed to fit his new circumstances or disposition. Thus Abram became Abraham, and Jacob became Israel. Neither the Hebrews, Egyptians, Assyrians, Babylonians, Persians nor Greeks had surnames; and in the earliest period of their history the same may be said of the Romans. In course of time, however, every Roman citizen had three names, the *praenomen*, or personal name, the *nomen*, or name of the gens or clan, and the *cognomen*, or family name, as Publius Cornelius Scipio. Conquerors were occasionally complimented by the addition of a fourth name, or *agnomen*, commemorative of their conquests, as Publius Cornelius Scipio *Africanus*. Greek names often implied some great virtue, some special favoritism on the part of the gods or some future great event; while Roman names referred often to the personal appearance and were frequently supplemented by the occupation, place of birth or a nickname. Times of great public excitement have had a very considerable influence in modifying the fashion in names.

It is impossible to state with any degree of certainty when the modern system of personal nomenclature became general. Surnames were introduced by the Norman adventurers, but were for centuries confined to the upper classes. They became general in Scotland about the twelfth century. In some of the wilder districts of Wales they can hardly be said to have been adopted even yet. The principal sources from which surnames have been derived are personal characteristics (Black, Long, Short); rank, profession or occupation (Bishop, Knight, Miller); localities or natural objects (Hill, Dale, Stone), and patronymics (Johnson, Wilson, Andrews). The Scotch *Mac*, the Irish *O'*, the Norman *Fitz*, the German *-sohn*, the Scandinavian *-sen* and the Russian *-vitch* have the same force as the English *-son*. The Hebrews had no surnames proper, but to distinguish two men of the same name they used the form Solomon ben David (Solomon, son of David). The Welsh use the word *ap* in the same way—Evan ap Richard (John, son of Richard). In most nations the wife changes her surname on marriage to that of her husband; in Spain, however, she retains it, while the son may adopt either the paternal or the maternal name. In many states of the Union, a man can change his name only by securing a special act of the legislature of his state.

Namur, *na moor'*, a town of Belgium, capital of the province of the same name, situated at the junction of the Sambre and the Meuse, 36 mi. s. e. of Brussels. The most notable buildings are the cathedral, the townhall and the citadel, which is supposed to occupy the site of one of Caesar's camps. The town carries on manufactures of cutlery and hardware. In the wars of Louis XIV and William III, in the late seventeenth century, Namur was several times besieged. Population in 1900, 32,333.

Nana Sahib, *nah'na sah'hib*, (about 1820–?), the leader of the Sepoys in the Indian mutiny. He was adopted by the ruler of the Mahratta State of Bithur, but on the death of the latter the British government refused to recognize Nana's claim to the succession. In May, 1857, there arose a mutiny of the Sepoys in Cawnpore, and Nana, after offering to help the English, treacherously placed himself at the head of the mutineers. The Europeans in Cawnpore capitulated on a promise that they should be sent down the Ganges in safety, but the men were all shot down, and the women and children were massacred, on the approach of a British force. Nana was defeated by Sir H. Havelock, and was driven across the frontier into Nepal. There all knowledge of him ceases, but the general opinion is that he escaped into central Asia.

Nancy, *nahN se'*, a town of France, capital of the Department of Meurthe-et-Moselle. It is a well-built town, with broad streets and fine buildings. The ancient citadel, the ducal palace and the Hotel de Ville are among the most noteworthy structures. One of the leading universities of France, comprising schools of medicine, law, science, philosophy and pharmacy, is located at Nancy. The chief manufactures of the town consist of broadcloth and other woolen stuffs, cotton goods, hosiery, lace, boots and shoes, embroidery and musical instruments. The trade is extensive. At Nancy was fought in 1477 the battle between the duke of Lorraine and Charles the Bold of Burgundy, who was defeated and slain (See Charles the Bold). From 1820 to 1873 the town was occupied by the Germans. Population in 1901, 102,559.

Nan'du. See Rhea.

Nankeen' or **Nankin**, a kind of cotton cloth, usually of a yellow color, originally manufactured and imported from Nanking in China. The peculiar color of these cloths is natural to the cotton of which they are made. Nankeen is now imitated in most other countries where cotton goods are woven.

Nanking', a city of China, capital of the Province of Kiangsu, on the Yang-tse-Kiang, about 580 mi. s. s. e. of Peking. It is 18 miles in circumference and is surrounded by a wall, which is in most places over 40 feet high. A military college, an arsenal and factories for the making of materials of war are the most important features of the town. The city was at one time the capital of the Chinese Empire, but when the seat of government was transferred to Peking, about the end of the fourteenth century, Nanking lost its importance and a great part of its population. The city was held from 1853 to 1864 by the Tai-pings, who made it their capital. The famous porcelain tower, completed in the fifteenth century, was destroyed during the Tai-ping rebellion. Nanking is still one of the chief literary centers of China. Population, estimated at 270,000.

Nansen, *nahn'sen*, FRIDTJOF (1861–), a Norwegian Arctic explorer. He was educated in the university at Christiania, devoting himself to zoölogical study. Before he was of age he made a notable voyage between Spitzbergen and Greenland to investigate animal life in those regions; and in 1888 he made his memorable expedition across Greenland on the ice cap, on his return from which he received a grand ovation from his countrymen.

FRIDTJOF NANSEN

But the achievement on which his fame as an explorer must rest was the expedition on which he started in June, 1893, from Christiania, the capital of his native land, to the Arctic regions, with twelve companions, in the *Fram*, a vessel constructed after his own plan, specially adapted to resist the pressure of ice floes. In September of the same year, he thrust his vessel into an ice pack, in which the party drifted, thus imprisoned, for eighteen months, until March, 1895. Nansen now, with one companion, left the ship and made his way by sledges toward the Pole. After the endurance of fearful hardship, he reached latitude 86° 4′, but was then obliged to turn back to an island of the Franz Josef Land Archipelago, where he passed the winter in a stone hut. A start for Spitzbergen was made May 19, 1896, and when off Cape Flora he and his companions were fortunate enough to encounter Captain Jackson, of the British exploring expedition, who provided them with food and clothing. After an absence of three years, Nansen reached his home on Jackson's ship, and about simultaneously his vessel, the *Fram*, reached the Norwegian coast.

The most important discovery made by Doctor Nansen was the development of the fact that there is no Arctic continent, as had been invariably assumed by previous Arctic explorers, but only an immense ocean of great depth. During his three years' exile from civilization he passed over hundreds of miles of hitherto unexplored coast, discovered a number of new islands and traversed 50,000 square miles of unknown waters. The highest point reached by him in the Arctic regions was 195 miles nearer the North Pole than any man had ever before been, and 261 miles, by his calculation, from the Pole itself. Nansen wrote a popular account of his voyage, *Farthest North*. See NORTH POLAR EXPLORATION.

Nantes, *nahNt*, a town of France, capital of the Department of Loire-Inférieure, on the Loire, 250 mi. s. w. of Paris. The situation, on an important navigable river, within 40 miles of the ocean, is highly advantageous for commerce. Among the chief public buildings are the Cathedral of Saint Pierre, the castle of the old dukes of Brittany, the Hotel de Ville, the museum of natural history, the museum of painting and the theaters. The chief industries of the town are shipbuilding, the manufacture of ships' boilers and machinery, linens, cottons, sail cloth, leather and soap, and the production of tobacco and sardines. Before the conquest of Gaul by the Romans, Nantes was a place of some note. For a long time it formed one of the most valuable possessions of the dukes of Brittany, but in 1499, when Anne of Brittany married Charles VIII, it passed with the rest of her possessions to the crown of France. The most famous event in its history was the issuing of the famed Edict of Nantes (See NANTES, EDICT OF). In 1793 it was the scene of some of the most atrocious massacres of the French Revolution. As many as six hundred people are known to have perished in one day, and thousands were killed in the town and surrounding country. Population in 1901, 132,990.

Nantes, EDICT OF, a decree issued by Henry IV of France, April 13, 1598, ending the religious wars of the country. It put the Huguenots on an equality with the Catholics in political rights and conceded them greater freedom of worship than they had formerly enjoyed. They were allowed to establish new churches, except in Paris and the surrounding districts and in royal residences, and to maintian their four theological colleges; but they must celebrate the Catholic festivals and pay tithes to the Catholic priesthood. In 1685, by a decree of Louis XIV, the edict was revoked. As a consequence of this act, about 500,000 of the Huguenots emigrated to other countries.

Nan′ticoke, PA., a borough in Luzerne co., 8 mi. s. w. of Wilkesbarre, on the Susquehanna River and on the Pennsylvania, the Lackawanna and other railroads. The mining of anthracite coal is the principal industry, and there is also considerable manufacturing of implements, hosiery, flour, cigars and other articles. It was settled about 1850 and was incorporated in 1874. Population in 1900, 12,116.

Nantuck′et, an island off Massachusetts, 18 mi. s. of Cape Cod, 15 mi. long and from 3 to 4 mi. wide. The town of Nantucket is situated on the south side of the island and has a deep and secure harbor. It was formerly an important port for whaling vessels. The climate of Nantucket is mild in winter and cool in summer, and the place is a popular summer resort.

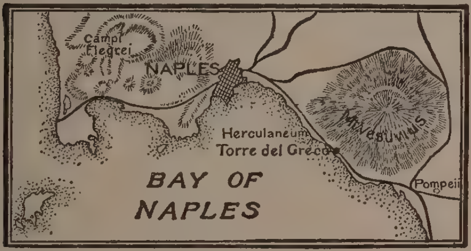
Naphtali, *naf′ta li*, (my wrestling), the sixth son of Jacob and the head of one of the twelve tribes. The tribe had its full share in repelling the incursions of the Canaanites during the first centuries of the conquest, but it disappeared from history when Tiglath-Pileser overran the north of Israel and bore away the whole of the population to Assyria. Under the name Galilee, the district occupied by the tribe became in New Testament times more famous than it had ever been before.

Naphtha, *naf′tha* or *nap′tha*, the name first given to the mineral oil now known as petroleum, and now used to include most of the inflammable liquids produced in distilling animal or vegetable substances. Petroleum is now sometimes called native or mineral naphtha. Another liquid produced by the distillation of bog-head coal, is known as bog-head naphtha. The name is also applied in a general way to the light liquids formed in the distillation of petroleum and used in the manufacture of varnishes. These are divided into gasoline, benzine and naphtha, of which naphtha is the heaviest and contains the largest proportion of oil. This naphtha is sometimes sold under the name of petroleum spirit or petroleum ether. See PETROLEUM.

Napier, *na'py ur,* a town situated on the north island of New Zealand. It is important because of its excellent harbor. It is the terminus of a railway extending into the interior of the island, and it has a museum and fine municipal buildings. Napier is in the center of a grazing region and is a wool market of considerable importance. It also exports large quantities of canned and frozen meats. Population in 1901, 8775.

Napier, *nape'yur* or *na peer',* JOHN (1550–1617), a Scotch mathematician, born near Edinburgh. His fame rests chiefly on his invention of logarithms. The invention was very soon known over all Europe and was everywhere hailed with admiration by men of science. See LOGARITHMS.

Naples, *na'pl'z,* a city in southern Italy, the largest in the kingdom, situated on the northern shore of the beautiful Bay of Naples, at the foot of Mount Vesuvius, about 120 mi. s. e. of Rome. It is built partly along the shore, partly on the slope of the hills, and is one of the most picturesque cities of the world. In the modern part of the city there are wide, regular, well-kept streets, but the older portion is comparatively unattractive. Among the chief buildings are the cathedral, begun in the thirteenth century; the churches of San Paolo Maggiore, San Domenico Maggiore, the Annunziata and other churches to the number of four hundred; the royal palace, with its noteworthy paintings; the old palace, and the national museum, which contains a remarkable collection of antiquities from Pompeii and Herculaneum. The city has a university which dates from the thirteenth century and which is attended by about five thousand students. There are also schools of medicine, engineering, music and military affairs, besides numerous hospitals and charitable institutions. The city is well supplied with street railways, which connect it, also, with various towns in the surrounding country.



The manufactures of Naples, which are numerous but individually unimportant, include macaroni and vermicelli, silks, cottons and woolens, glass, china, musical instruments, artificial flowers, perfumery, soap, machinery and many other articles. The harbor accommodations are excellent, and the trade is second in importance among Italian cities. Naples is one of the most densely populated cities in Europe. In the environs are situated the tomb of Vergil, the ancient Roman cities of Herculaneum and Pompeii and the remains of Roman temples, villages, palaces and tombs.

Naples was founded by a Greek colony from the town of Cumae many centuries B. C. It took the name of Neapolis (New City) to distinguish it from an older Greek city adjoining, called Parthenope. Naples passed to the Romans in the third century B. C. and under them flourished for several centuries. After the fall of the Western Roman Empire, the Ostrogoths held the city for a time, and from them it passed to the Byzantines in the sixth century. In 1130 the Norman Robert Guiscard united the south of Italy and the adjacent island of Sicily into one state, and from that period the history of Naples ceases to be the history of a city and becomes a part of the history of the Kingdom of the Two Sicilies, of which Naples was recognized as the metropolis (See SICILIES, KINGDOM OF THE TWO). Population in 1901, not including suburbs, 563,540.

Naples, BAY OF, an inlet of the Mediterranean, on the west coast of Italy, extending for about 22 mi. from Cape Miseno, its northwest boundary, to Cape Campanella, its southeast limit. It is separated from the open sea by the islands of Procida, Ischia and Capri. Its shores have been for ages the scene of powerful volcanic agency, and the scenery has long been celebrated for its beauty and grandeur. Mount Vesuvius is the most distinctive and striking feature.

Napo'leon I (1769–1821), emperor of the French, was born at Ajaccio, **Corsica,** and was the son of Charles Bonaparte, an advocate, and of Letizia Ramolino. In his tenth year he was sent to the military school of Brienne, and after a short time spent at the military school of Paris he received his commission as lieutenant of artillery. In 1792 he became captain of artillery, and in 1793 he was sent to assist in the reduction of Toulon, then in the hands of the British. The place was captured almost entirely through his strategic genius; and in the following February he was made a brigadier general of artillery. In 1795, when the mob of Paris rose against the Convention, Napoleon was made commander of the five thousand troops provided for its defense. He had only a night to make arrangements, and next morning he cleared the streets with grape, disbanded the National Guard, disarmed the populace and ended the outbreak. Early in 1796 Bonaparte married Josephine de Beauharnais, and soon after he had to depart to assume the command of the army of Italy against the forces of Austria and Sardinia. By a series of victories, culminating in that of Lodi, he forced Naples, Modena and Parma to conclude a peace; the pope was compelled to sign an armistice, and the whole of northern Italy was in the hands of the French. Army after army sent by Austria was defeated, and Napoleon carried the war into the enemy's country and by the Peace of Campo Formio, 1797, compelled Austria to cede the Netherlands and Lombardy in return for the Province of Venetia. The pope had previously been forced to cede part of his dominions.

In December, 1797, Napoleon returned to Paris, where his favor with the people was great. The Directors, fearing him on account of his newly acquired influence, were anxious to get him out of France, and a plan soon presented itself. Realizing that, after Austria, England was the most dangerous enemy which France had, the Directors determined to strike a blow at her by invading Egypt, as a preliminary step to the conquest of British India. Napoleon was put in command of the expedition, and in July, 1798, he landed at Alexandria. This city fell after a short resistance, and Cairo was taken within the same month, after the sanguinary Battle of the Pyramids. In August the word reached the army in Egypt that Nelson had annihilated the French fleet in the Bay of Aboukir. All means of return to Europe for the French were thus cut off; but Napoleon, having suppressed with rigor a riot in Cairo, advanced to attack the Turkish forces assembling in Syria. He took El Arish and Gaza and stormed Jaffa; but after sixty days' siege he was compelled to abandon the attempt to capture Acre, which was defended by a Turkish garrison, assisted by Sir Sidney Smith and a small body of English sailors and marines. Bonaparte returned to Egypt in June, 1799, and in July attacked and almost annihilated a Turkish force which had landed at Aboukir. On August 22 he abandoned the command of the army to Kléber and sailed for France, having learned that the Directory was in danger through a royalist rising and that the people were longing for a return of some sort of order. He secured the coöperation of his brother Lucien, Talleyrand, Siéyès and others, and by a sudden stroke he abolished the Directory on the 18th and 19th Brumaire (November 9 and 10). A new constitution was then drawn up, chiefly by Siéyès, under which Napoleon was made first consul, with Cambacérès and Lebrun as second and third consuls. From

NAPOLEON BONAPARTE

this time Napoleon was virtually ruler of France.

His government was marked by sagacity, activity and vigor in the administration of civil affairs, by the proclamation of complete freedom of religious worship, by the reconstruction of the school system and by the compilations of the famous body of laws known as the Code Napoleon. But war was his element, and in 1800 he resolved to strike a blow at Austria. Having executed a daring march into Italy across the Great Saint Bernard, he defeated the Austrians at Marengo, and after the decisive Battle of Hohenlinden forced Austria to conclude peace by the Treaty of Lunéville. Treaties were subsequently concluded with Spain, Naples, the pope, Bavaria, Portugal, Russia and Turkey, and finally, the Treaty of Amiens was signed by England. In 1802 Napoleon was proclaimed by a decree of the senate consul for life, and in 1804 he had himself crowned as emperor, upward of three million votes of the people being given in favor of this measure.

In 1803 war had again broken out with Great Britain, and Napoleon collected an army and flotilla which were to invade England. In 1805 Britain, Russia, Austria and Sweden united against Napoleon, who marched at once across Bavaria at the head of the army collected for the invasion of England and compelled the Austrian General Mack to capitulate at Ulm. This surrender occurred on the day before Nelson by his great victory at Trafalgar established the British supremacy on the sea. In November, Napoleon entered Vienna, and in the following month he completely routed the allied Russian and Austrian armies at Austerlitz. This was one of his greatest victories, and the Austrian emperor immediately sued for peace, giving up to France all his Italian and Adriatic territories. Napoleon now turned to the organization of the territory which had come into his power. Early in 1806, a French army occupied the continental part of the Neapolitan states, and Joseph Bonaparte was declared king, on the deposition of their former sovereign. Another brother of the emperor, Louis, became king of Holland, and various districts in Germany and Italy were erected by the conqueror into dukedoms and bestowed upon his most successful generals. This brought him into collision with Prussia, and war was declared. Late in 1806 Napoleon defeated the enemy at Jena, while one of his generals on the same day gained the victory of Auerstädt. On October 25 Napoleon entered Berlin and issued the celebrated Berlin Decree, thus instituting the important Continental System. He then marched northward against the Russians, who were advancing to assist the Prussians. At Pultusk and at Eylau he met with severe checks; but in the summer of 1807 the Battle of Friedland was fought, which was so disastrous to the Russians that Alexander was compelled to sue for an armistice. The result was the Peace of Tilsit, by which the king of Prussia received back half of his dominions and Russia undertook to close her ports against British vessels. The duchy of Warsaw was erected into a kingdom and given to the king of Saxony; the kingdom of Westphalia was formed and bestowed upon Jerome, Napoleon's youngest brother; Russia obtained a part of Prussian Poland, and by secret articles she was allowed to take Finland from Sweden.

As Portugal had refused to respect the Berlin Decree, Napoleon now sent Junot to occupy Lisbon; and because the administrative affairs of Spain had fallen into confusion, he sent into that kingdom an army under Murat, which took possession of the capital. By the Treaty of Bayonne Charles IV was obliged to resign the Spanish crown, which was given to Joseph Bonaparte, Murat receiving the vacant sovereignty of Naples. The great body of the Spanish people rose against this summary disposal of the national crown, and Britain aided them in their resistance. Thus was begun the Peninsular War, which lasted seven years. In the meantime Austria again declared war and got together an army in splendid condition, under the Archduke Charles. Napoleon hurried into Bavaria, encountered the archduke at Eckmühl, completely defeated him and entered Vienna.

He was himself defeated at Aspern and Esslingen; but at Wagram (1809) the Austrians were completely crushed, and Napoleon was thus enabled to dictate his own terms of peace. On his return to Paris, Napoleon divorced Josephine, who had borne him no children, and soon afterward married the Archduchess Maria Louisa of Austria, thus entering into closer relations with that country.

The years 1810 and 1811 were the period of Napoleon's greatest power. But now the tide began to turn. Russia found it impossible to carry out the continental blockade and give due effect to the Berlin Decree; so in May, 1812, Napoleon declared war against that country and soon invaded it with an army of nearly six hundred thousand men. The Russians retired step by step, wasting the country, carrying off all supplies and avoiding as far as possible general engagements. The French pushed rapidly forward, defeated the Russians at Borodino and elsewhere and entered Moscow only to find the city on fire. It was impossible to pursue the Russians farther, and nothing remained but retreat. The winter was uncommonly severe, and swarms of mounted Cossacks incessantly harassed the French, now sadly demoralized by cold, famine, disease and fatigue. Of the invaders, only about twenty-five thousand left Russia. Napoleon immediately ordered a fresh conscription, but the spirit of Europe was now fairly roused. A coalition, consisting of Prussia, Russia, Great Britain, Sweden and Spain, was formed, which early in 1813 sent its forces toward the Elbe. Napoleon defeated the allies at Lützen, at Bautzen and at Dresden; but the last was a dearly-bought victory for the French, who were now so outnumbered that their chief was compelled to fall back on Leipzig. There he was completely hemmed in, and in the great "Battle of the Nations," which was fought October 16, 18 and 19, he was completely defeated. He succeeded in raising a new army, and from January to March, 1814, he confronted the combined hosts of the allies. But numbers were against him; and Wellington rapidly advanced upon Paris from the south. The last of March the allies captured the fortifications of Paris and entered the city, and early in the following month Napoleon abdicated at Fontainebleau. He was allowed the sovereignty of the island of Elba, with the title of emperor and a revenue of six million francs.

After a residence of ten months he made his escape from the island and landed at Fréjus, March 1, 1815. Ney and a large part of the army joined him, and he made a triumphal march upon Paris, driving Louis XVIII from the throne. The allied armies once more marched toward the French frontier, and Napoleon advanced into Belgium to meet them. June 16 he defeated Blücher at Ligny, while Ney held the British in check at Quatre-Bras. Wellington fell back upon Waterloo, where he was attacked by Napoleon on the 18th, the result being the total defeat of the French. The allies marched without opposition upon Paris. Napoleon abdicated in favor of his son and tried to escape from France, but failing, he surrendered to the captain of a British man-of-war. With the approval of the allies he was conveyed to the island of Saint Helena, where he was confined for the rest of his life. He was buried in the island, but in 1840 his remains were transferred to the Hôtel des Invalides at Paris.

Napoleon II. See REICHSTADT, NAPOLEON FRANÇOIS JOSEPH BONAPARTE, Duke of.

Napoleon III, CHARLES LOUIS NAPOLEON BONAPARTE (1808–1873), emperor of the French. He was the youngest son of Louis Bonaparte, brother of Napoleon I and king of Holland, and of Hortense Beauharnais. By the death of his cousin, the Duke of Reichstadt, he became the recognized head of the Bonaparte family, and from this time forward his whole life was devoted to the realization of a fixed idea that he was destined to occupy his uncle's imperial throne. In 1836 an attempt was made to secure the garrison of Strassburg, but the affair turned out a ludicrous failure. In 1840 he made a foolish and theatrical descent on Boulogne, was captured, tried and sentenced to perpetual confinement in the fortress of Ham, but after six years in prison he escaped to England. On the outbreak of the Revolution of 1848, he hastened to Paris, and securing a seat in the National Assembly, he began at once his candidacy for the presidency. On the day of the election, it was found that he had received a majority of four million. Although he took the oath of allegiance to the Republic, he looked forward to a higher position. At last, in December, 1851, the president declared Paris in a state of siege, issued a decree dissolving the Assembly and another ordering the reëstablishment of universal suffrage and the election of a president for ten years. When the vote came to be taken, an enormous majority was in favor of his retaining office for ten years, with all the powers he demanded.

As soon as he found himself fully confirmed in this ambition, he began to prepare for the restoration of the Empire. In January, 1852, the National Guard was revived, a new constitution was adopted and new orders of nobility were issued; and at last, on December 1, Louis Napoleon Bonaparte was proclaimed emperor, under the title of Napoleon III. In March, 1854, Napoleon III, in conjunction with England, declared war in the interest of Turkey against Russia; and in 1859, when war was declared between Austria and Sardinia, Napoleon took up arms in favor of his Italian ally, Victor Emmanuel. The allies defeated the Austrians at Montebello, Magenta, Marignano and Solferino, and France won much glory from these victories. In 1860 the emperor sent out an expedition to China to act in concert with the British; and in 1861 France, England and Spain agreed to dispatch a joint expedition to Mexico for the purpose of exacting redress of injuries, but the English and Spaniards soon withdrew. The French continued the quarrel, and an imperial form of government was instituted, Maximilian, archduke of Austria, being placed at its head, with the title of emperor. Napoleon, however, withdrew his army in 1867, and the unfortunate Maximilian, left to himself, was captured and shot. On the conclusion of the Austro-Prussian War of 1866, Napoleon, jealous of the growing power of Prussia, demanded a reconstruction of frontier, which was peremptorily refused. The ill-feeling between the two nations was increased by various causes, and in 1870, war was declared by France. Prussia was well prepared for the struggle, which had long been foreseen in that country, but Napoleon seems to have been greatly deceived as to the state of France. The disastrous close of the war, therefore, was a great surprise to him (See FRANCO-GERMAN WAR). After the surrender at Sedan he was kept a prisoner for a time at the Castle of Wilhelmshöhe, and then he joined his wife and son in England, where he remained till his death. His only child, the prince imperial, who joined the British army in South Africa as a volunteer, was killed by the Zulus.

Narbada, *nur bud′a.* See NERBUDDA.

Narbonne, *nahr bun′*, a town of France, in the Department of Aude. Its most interesting building is the old cathedral begun in the Middle Ages and now known as the Church of Saint Just. The manufactures of the city, which include verdigris, candles, pottery and leather, are comparatively unimportant. The honey of Narbonne is celebrated. The city was the first colony which the Romans founded beyond the Alps, and it grew to be the metropolis of southern Gaul. Despite this fact, it is very poor in Roman remains. Population in 1901, 24,607.

Narcissus, *nar sis′sus,* according to Greek mythology, the son of the river god Cephissus, of great beauty, but excessively vain. Echo, a nymph who loved him, pined away to a mere voice, because her love for him found no return, and Nemesis, determined to punish him for his coldness of heart, caused him to drink at a certain fountain, wherein he saw his own image, with which he fell violently in love. With this passion he, too, pined away, until the gods transformed him into the flower which still bears his name.

Narcissus, an extensive genus of bulbous plants, mostly natives of Europe. The species are numerous, and from their hardiness, delicate shape, gay yellow or white flowers and sweet fragrance, they have long been favorite objects of cultivation, especially the daffodil, the jonquil and the white narcissus. Some of the more hardy species grow wild in English woods and under English hedges.

NARCISSUS

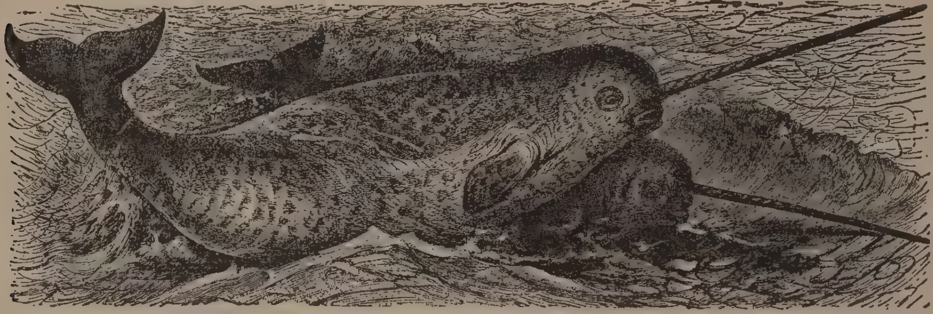
Narcot′ic, a substance which, in small doses, diminishes the action of the nerves and brings on sleep. Most narcotics are stimulating when given in moderate doses; in larger doses they produce sleep, and in poisonous doses they bring on stupor, convulsions and even death. Opium, hemlock, henbane, belladonna, aconite, camphor, digitalis, tobacco, alcohol, leopard's bane and a variety of other substances are narcotics.

Nar′ragan′sett, in colonial times, a leading indian tribe occupying Long Island and the present State of Rhode Island. They cherished the friendship of Roger Williams, but joined in King Philip's War, losing nearly 1000 men in the famous Swamp Fight. After the death of their leader, Canonicus, they were quickly subdued and now survive only in mixed bloods.

Narragansett Bay, an inlet of the Atlantic which extends into Rhode Island for about 28 mi., almost to Providence. Newport is situated near the southern end of the bay.

Narvaez, *nahr vah'aith*, PANFILO DE (1470?–1528), a Spanish adventurer and explorer, who, in 1528, left Cuba with an expedition for the purpose of exploring the southeastern part of what is now the United States. He was betrayed and misled by indian guides and was finally forced to put to sea. After cruising along the Gulf coast for several months, most of the party were swept to their destruction by the rush of waters from the Mississippi.

Narvaez, RAMON MARIA, Duke of Valencia (1800–1868), a Spanish statesman and general. Early in life he entered the Spanish army and rapidly acquired distinction. When Gomez, the Carlist general, was engaged in his adventurous march through Spain, in 1836, Narvaez was directed to pursue him and totally routed him near Arcos. He then devoted himself to politics and became the rival of Espartero himself. Having taken part in an unsuccessful rising against Espartero, he fled to France. In 1843 he hastened to Spain, put himself at the head of an insurrection and entered Madrid. In the following year he formed his first ministry and received from Queen Isabella the rank of marshal and the title of duke of Valencia. His government was overthrown in 1846, but he was soon recalled, and during the remainder of his life he was several times entrusted with the formation of a cabinet.


NARWHALS

Narwhal, *nahr'wal*, a marine mammal found in the northern seas, averaging from twelve to twenty feet in length. The body color is whitish or gray, spotted with darker patches. There is no dorsal fin. It has a straight, spiral horn, tapering to a point and measuring in length from six to eight feet. This horn is of a fine white material, somewhat like ivory, and it serves as a dangerous weapon against an enemy. The narwhal has obtained the name of the *sea unicorn*, *unicorn fish* or *unicorn whale*. The food of the narwhal appears to consist chiefly of mollusks. The Greenlanders obtain oil from the blubber and manufacture the skins into various useful articles.

Nasal, *na'zal*, **Duct.** See LACHRYMAL GLANDS.

Nas'by, PETROLEUM V. See LOCKE, DAVID R.

Naseby, *naz'by*, BATTLE OF, a famous battle, fought on June 14, 1645, in the parish of Naseby, in Northampton, England. The struggle was between Charles I and the Parliamentary army under Fairfax and Cromwell, and it ended in the complete defeat of the royalists.

Nash'ua, N. H., one of the county-seats of Hillsboro co., about 33 mi. s. of Concord, on the Nashua River near the Merrimac, and on several divisions of the Boston & Maine railroad. In size it is the second city in the state. A canal from the Nashua to the Merrimac furnishes good water power, and there are large cotton mills, and manufactures of machinery, paper, boilers, furniture, shoes, saddlery and hardware. The city has a public library, a United States fish hatchery and the Saint Francis Xavier church, which is one of the finest in the state. The place was settled in 1655. It was incorporated as the Township of Dunstable in 1673, was given its present name in 1746 and was chartered as a city in 1853. Population in 1900, 23,898.

Nash'ville, TENN., the capital of the state and the county-seat of Davidson co., 209 mi. w. by n. of Memphis and 186 mi. s. by w. of Louisville, Ky., on the Cumberland River and on the Nashville, Chattanooga & Saint Louis, the Tennessee Central and eight lines of the Louisville & Nashville railroad. The city is regularly laid out on the river bluffs. There are several public parks, of which the Centennial, containing the Parthenon, is the most important. Mount Olivet Cemetery is a beautiful burying ground, and there is a large national cemetery north of the city. The state capitol, on the top of Cedar Hill, is the most prominent structure in the city. Near it are the tomb of James K. Polk and an equestrian statue of Andrew Jackson. The charitable institutions include the state hospital for the insane and the Saint Thomas and City hospitals. There are about 170 religious organizations, many of which have fine churches. Nashville is a very important educational center, containing Vanderbilt University, Peabody Normal College, the University of Nashville, Fisk University, Roger Williams University, Central Tennessee College, Ward Seminary, Boscobel College, Belmont College and three medical, two dental, two law and four business schools. The state institutions for the blind and the state industrial school are also located here. The city has a Carnegie library, a state library and the Watkins Institute, which contains the collections of the state historical society.

The city is an important trade center and ships large amounts of agricultural implements, boots and shoes, lumber products, hardware, dry goods, hats and other goods. The manufacturing establishments are numerous and varied, including flour and grist mills, stove foundries, wooden ware factories, fertilizer works and harness, clothing, tobacco and other factories. The place was settled in 1780 by a band of pioneers under the leadership of James Robertson, and it was named in honor of Abner Nash, then governor of North Carolina. It was incorporated as a town four years later and was chartered as a city in 1806. In 1862 the city was occupied by a Federal army, and it was the scene of the Battle of Nashville in 1864. Population in 1900, 80,865; estimated in 1904, 140,985.

Nashville, Battle of, an important battle of the Civil War, fought at Nashville, Tenn., December 15 and 16, 1864, between a Federal force, under General Thomas, and the Confederate Army of the Tennessee, under General Hood. The latter had evacuated Atlanta early in September and had struck northward, hoping to draw Sherman from his proposed march to the sea. Sherman dispatched Thomas to defend Tennessee and provided him with able assistants, including generals Schofield and Smith and cavalry under General Wilson, numbering all told about fifty-five thousand. At Franklin, on November 30, General Hood attacked General Schofield, who was slowly retreating toward Nashville, and was repulsed. The Confederates reached the vicinity of Nashville December 2, but Thomas did not offer battle for two weeks, though urged and ordered to do so and even threatened with dismissal. At last, on December 15, he proceeded against the Confederate position, and after a battle lasting for two full days, the Confederates were almost surrounded and compelled to withdraw. Harassed by Federal cavalry, they began a retreat which soon became a rout. So complete was the disaster, that the Confederate force was never reorganized, and General Hood asked to be relieved of his command. The loss of the Federals was incredibly small, in view of the heavy fighting.

Nashville, University of, a co-educational institution, established at Nashville in 1785, by the State of North Carolina, under the name of Davidson Academy. When Tennessee became a state, the name of the school was changed to Cumberland College, and later it became the University of Nashville. The Civil War necessitated closing the institution, but in 1875 the trustees of the university, together with the trustees of the Peabody Educational Fund, established in its place a normal school for the training of teachers. Preparatory, collegiate and medical departments have since been added, and the university is now in a prosperous condition. The faculty numbers about thirty-five, and the average enrollment of students is about 900. The library contains 20,000 volumes, the endowment fund is about $107,000 and the annual income, about $80,000.

Na'smyth, James (1808–1890), a Scotch engineer, born and educated at Edinburgh. He became a manufacturer of machine tools, in which he developed a large industry. The steam hammer, which has rendered possible the immense forgings now employed, was invented by him in 1839. The steam pile driver and the safety foundry ladle are among his other inventions. He has also acquired fame as an astronomer. See Steam Hammer.

Nast, Thomas (1840–1902), an American caricaturist, born in Bavaria and brought to the United States in 1846. After service in England and Italy, he began drawing war sketches for *Harper's Weekly* in 1862. In his particular line, pictorial satire, Nast stands in the foremost rank. By his severe and pointed caricatures, he did much toward breaking up the notorious Tweed "ring" of New York. Nast also produced some creditable oil paintings.

Nasturtium, *nas tur′shum,* the name applied by the botanist to the watercress. It is also the common name of a cultivated plant, often trailing or climbing, which produces curious round leaves and large, irregular flowers of brilliant colors. There are many species of nasturtiums, natives of South America and Mexico, but they are extensively grown in the United States, where they are a favorite garden flower.

NASTURTIUMS

Natal, *na tahl′,* a British colony on the southeast coast of Africa, northeast of Cape Colony and southwest of the Transvaal colony. Zululand and a part of the territory which formerly belonged to the Transvaal Republic have of late years been annexed to Natal, which now has an area of about 35,371 square miles. The only spot where sheltered anchorage can be obtained is at Port Natal, a fine circular bay near the center of the coast. The soil is generally rich and strong, and wheat, barley, oats, maize, beans and vegetables of almost every description have been largely and successfully grown. In many parts vines and fruit trees thrive, and in the coast region cotton, tobacco, indigo, sugar cane and coffee grow well. In the less frequented parts of the interior, elephants and lions are still occasionally seen, and hyenas, tigers, antelopes, jackals and porcupines are numerous. The mineral productions are principally coal, iron, limestone and marble. The trade of the colony is extensive, and the principal exports are coal, gold, wool, sugar, hides and bark.

Natal was discovered on Christmas Day, 1497, by Vasco de Gama and was named by him in honor of the day (the Nativity). The first permanent settlers of the territory were Dutch Boers, who left Cape Colony in 1836, entered Natal and three years later proclaimed themselves an independent republic. The establishment of a hostile settlement at the only port between Algoa and Delagoa bays was incompatible with British interests, and in 1843 Natal, after a determined resistance by the Boers, was proclaimed a British possession. In 1858 it was proclaimed a separate colony. During the South African War considerable fierce fighting occurred in Natal, some of the most important battles of the war taking place at Glencoe, Ladysmith and all along the line of the Tugela (See SOUTH AFRICAN WAR). The capital is Pietermaritzburg. Population in 1904, estimated at 1,109,000, of whom from 75,000 to 100,000 are Europeans.

Natch′ez, MISS., the county-seat of Adams co., 100 mi. s. w. of Jackson, on the Mississippi River and on the New Orleans & Northwestern and the Yazoo & Mississippi Valley railroads. The city is situated on a bluff, which rises to an elevation of 200 feet above the river. It has many fine residences, good city and county buildings, several large hotels, the Fisk Library, Memorial Park, Stanton College, Natchez Institute, Temple Opera House and Institute Hall. A large national cemetery adjoins the city. The industrial establishments include cotton mills, compresses and oil mills, planing mills, an ice plant and other factories. A fort was built on the site of Natchez by the French in 1716, but it was destroyed by the indians in 1729. The city practically began when the English took possession of the old fort in 1763, according to the terms of the Treaty of Paris. The Spaniards captured the place in 1779, but gave way to the United States in 1798. Natchez was made a city in 1803 and was the capital of

Mississippi from 1798 to 1820. During the Civil War it was taken by Federal troops in 1863, soon after the fall of Vicksburg, and was held until the end of the war. Population in 1900, 12,210.

Na′tick, Mass., a town in Middlesex co., 17 mi. s. w. of Boston, on the Charles River and on the Boston & Albany railroad. It was settled by John Eliot in 1651 and was used by the founder until his death, chiefly as a home for converted indians. It was incorporated as a town in 1781. The principal manufactures are clothing, boots, shoes, tools and sporting goods The town contains the Bacon Public Library, Morse Institute, the Walnut Hill High School, a public park, a soldiers' monument and one to John Eliot. Population in 1905, including several villages, 9609.

National Academy of Design, an institution established in New York City in 1825 by a company of artists. Three years later it was incorporated, and Professor Morse, the inventor of the telegraph, was its first president (See Morse, Samuel F. B.). The membership does not exceed 100 and is confined strictly to artists, though others may obtain honorary memberships or fellowships which entitle them to certain privileges. The academy holds an annual exhibition, at which prizes are awarded for the most meritorious work. It also maintains a school of design, with classes in life, still life, anatomy, antique, painting, etching and other lines of artistic work.

National Academy of Sciences, an organization incorporated by Congress in 1863 for the purpose of investigating, experimenting and reporting on subjects of scientific note when required so to do by any department of the United States government. The membership is restricted to noted scientists and does not exceed one hundred. The members are divided into six groups, styled committees, each group having charge of a special line of research. The academy holds two meetings a year and awards medals for specially meritorious work in original research.

National Civic Federation, an organization formed in New York in 1901, for the purpose of considering and promoting means for securing industrial peace. The organization was the result of several conventions held in Chicago and New York, in which representative leaders of both capital and labor presented their views concerning measures for securing arbitration in industrial disputes. Finally, in December, 1901, a commission of 36 members, known as the industrial department, was established. It contained in its membership, besides well-known employers, the chosen representatives of organized labor and selected representatives of the interests of the public; it included Grover Cleveland, Charles W. Eliot, Archbishop Ireland, Mark Hanna, John D. Rockefeller, Samuel Gompers and John Mitchell. Besides attempting to prevent strikes and lockouts and to secure friendly relations between capital and labor, the members of the commission were to offer their services as a board of arbitration in labor disputes which had reached an acute stage. Though in the first years of the movement this board failed to accomplish all that its founders had hoped, it was instrumental in settling many strikes and in preventing many others.

National Debt, the aggregate of money owed by a government to individuals, corporations or other governments, for amounts advanced or assessed for war or commercial purposes. At various periods statesmen have become alarmed over the great increase in the public debts of given nations, but experience has proved their fears to be in the main groundless. When Adam Smith, the noted writer on political economy, entered his protest against "the progress of the enormous debts which at present (in 1776) oppress, and will in the long run probably ruin, all the great nations of Europe," the public debts of the entire civilized world were less than one tenth of their present aggregate, which is estimated in round numbers to be in the neighborhood of $29,000,000,000.

The English national debt was mainly acquired during the wars with Napoleon, but the debts of other European countries have been contracted largely since the middle of the nineteenth century. In 1862 foreign national bonds to the amount of nearly $3,500,000,000 were quoted on the London Stock Exchange, and within a decade this amount had increased to about $12,500,000,000. The change in national debts during the last thirty years of the nineteenth century is shown by the following table:

	1870.	1900.
France	$4,500,000,000	$5,850,000,000
United Kingdom	3,900,000,000	3,100,780,000
Austria-Hungary	1,750,000,000	1,168,035,000
Russia (European)	1,700,000,000	3,029,235,000
Italy	1,950,000,000	2,385,944,000
United States	2,220,000,000	1,107,711,000
Spain	1,375,000,000	1,788,514,000
Germany	1,000,000,000	570,040,000
Australasia	230,000,000	305,911,000
Turkey	675,000,000	784,469,000
Portugal	345,000,000	778,630,000
Brazil	475,000,000	577,139,000
Egypt	375,000,000	519,160,000
Canada	62,500,000	345.161,000

Spain owes, comparatively, the largest proportion to foreign lenders, while France owes the largest share of its debt to its own citizens. France takes the lead as a lending people, on account of the good financial standing and the saving propensities of its people. At present the total aggregate of interest paid annually on public debts in the world is $1,417,500,000, while twenty-five years ago it was $1,000,000,000, although the total debt at that time was $5,000,000,000 less than at the present. France pays in interest money about $227,000,000; Great Britain's annual interest is $138,000,000; Italy's $114,000,000; Germany's $23,000,000; Austro-Hungary's $50,000,000, and that of the United States $28,000,000.

The national debt of the United States at the close of the War of 1812 was $45,209,737. In 1832 it had been diminished to $24,322,235, and in 1835, to the minimum of $37,513. By 1850 it had risen again to $63,452,773, and at the breaking out of the Civil War it was $90,580,873. The following figures show the increase caused by the war, and the progress of diminishing the aggregate since its close:

1862	$ 524,176,412	1880	$2,128,791,054
1863	1,119,772,138	1890	1,585,821,048
1864	1,815,784,370	1895	1,701,033,661
1865	2,680,647,869	1900	1,107,711,000
1866	2,773,236,173	1905	989,866,772
1876	2,180,395,067		

National Democratic Party. See DEMOCRATIC PARTY.

National Educational Association. See EDUCATIONAL ASSOCIATION, NATIONAL.

National Guard, the name given to the militia organized in France at the time of the Revolution. It was introduced into Paris in 1789, was made up largely of the citizen class and was under municipal control. The membership in Paris was about 48,000, while it was reported that throughout the country the membership approached 4,000,000. In 1795 Napoleon defeated and broke up the National Guard, which had attempted to overthrow the Convention. Ten years later he reorganized it and made use of it in his latter campaigns. During the nineteenth century it was several times dissolved and reëstablished, and its final dissolution took place after the insurrection of the Commune in 1871. In the United States, the term is applied to the militia organized and maintained by the states. See MILITIA.

National Hymns. See HYMNS, NATIONAL.

Nationalist, a term applied to the Irish political party whose program includes more or less complete separation of Ireland from Great Britain.

National Monument or **The Denkmal**, as it is called by the Germans, a beautiful monument erected to commemorate the founding of the German Empire in 1871. It is opposite Bingen and stands 740 feet above the Rhine. The statue of Germania wearing an imperial crown and holding the laurel wreath and sword is placed on an enormous pedestal, which is decorated with beautiful reliefs.

National Museum of the United States. The choicest of the wonderful collections of historic articles, of animals, plants and the various things collected by government scientific expeditions are housed in the elegant building near the Smithsonian Institution on the west side of the Mall, at Washington. In the center of the building is the rotunda and dome, where, above the fountain's basin, is the plaster cast of Crawford's *Statue of Liberty*, that surmounts the dome of the Capitol. Among the historic relics of particular interest are articles that belonged to Washington, Jefferson, Jackson, Franklin and General Grant. An almost endless number of articles illustrate the costumes and manners of life of all the races from the Aborigines of America to the most civilized peoples of Europe. Besides these, there is a marvelously rich collection of natural history specimens and many lifelike groups of rare stuffed animals. Although the halls of the National Museum are already crowded, they contain only a part of the great collections belonging to the government. To obtain any conception of these a person must visit the museums of the Fish Commission, Smithsonian Institution and the great department buildings in other parts of Washington.

National Party. See POPULIST PARTY.

National Republican Party. See WHIG.

National Road. See CUMBERLAND ROAD.

Nations, LAW OF. See INTERNATIONAL LAW.

Nat Turner Insurrection. See TURNER, NAT.

Natural Bridge, a bridge formed by the wearing away of strata of soft rock overlaid by harder rock, thus leaving an arch. Most natural bridges are the remains of former caves, as is the most famous object of this sort in the United States, the Natural Bridge across Cedar Creek, Va., about 125 miles west of Richmond. The sides are nearly perpendicular; the arch is 215 feet high and from 50 to 100 feet wide, with a span, in its broadest part, of 90 feet. This bridge is considered one of the finest natural curiosities in the United States. A public road leads across the bridge.

Natural Gas, a gas found issuing naturally from crevices in the earth's crust in certain places, but obtained for economic purposes by boring wells. It is usually found in the same localities as petroleum and sometimes is confined under great pressure, so that when the well strikes the chamber, the gas rushes out with considerable force. The most important natural gas regions in the United States are in and about Pittsburg, Pa., in southern Ohio and in the central part of Indiana. The gas is valuable for heating purposes, but does not give a very good light. Because of its value as a fuel for smelting, iron and glass factories have been established in the natural gas regions in large numbers; but the extended use of the gas has led to such a diminution of pressure, that many of these factories have been obliged to resort to coal and coke for heating purposes. The gas has been pumped long distances and used in cities for fuel, but with its scarcity this use is being discontinued.

Natural History, in its widest sense, that department of knowledge which comprehends the sciences of zoölogy and botany, chemistry, natural philosophy or physics, geology, palaeontology and mineralogy. It is now, however, commonly used to denote collectively the sciences of botany and zoölogy, and it is sometimes restricted to denote the science of zoölogy alone.

Nat′uraliza′tion, the process whereby an alien is invested with the privileges and made liable to the obligations of a natural-born citizen. It implies the renunciation of one political status and the adoption of another. Formerly many states refused to recognize any act of naturalization as exempting the party naturalized from former allegiance. Thus the maxim of English common law, "Once an Englishman, always an Englishman," forbade a subject from adopting a new political status and rendered him liable to the penalties of treason, if found in arms against his native country. The existence of this principle gave rise to many disputes, more particularly between Great Britain and the United States, and it was not till the passage of the Naturalization Act of 1870, that her contention was formally abandoned by Britain. In the same year a treaty was entered into with the United States which provided that British subjects becoming naturalized in the United States should be treated in all respects as United States citizens, and *vice versa.*

The requirements for naturalization vary in different countries. In the United States a foreigner must make a declaration on oath of his intention to become naturalized. This oath may be taken before any court of record having common law jurisdiction (See COURTS), and the applicant must renounce any title of nobility. After the lapse of at least two years from the date of this declaration, and after five years' residence in the United States, he becomes an American citizen, and a certificate of naturalization is issued to him. There is, however, no uniform system of registration of such certificates, and, as there are about 3000 Federal and state courts having power to grant them, great difficulties sometimes arise in proving naturalization.

In Great Britain naturalization is effected either through a special act of Parliament or under the Naturalization Act of 1870, which provides that any foreigner who has resided in the United Kingdom for five years or has for that period held service under the Crown, can obtain a certificate of naturalization, or citizenship, from one of the principal secretaries of state. In France a foreigner who has obtained permission to become domiciled in France is entitled to letters of declaration of naturalization after three years' residence. Also, by the French Naturalization Act of 1889, a foreigner who has resided in France for ten years may be naturalized without preliminary ceremony. In Germany, naturalization can be conferred only by the higher administrative authorities; the applicant must show that he is at liberty, under the laws of his native country, to change his nationality, or, if he is a minor, that his father or guardian has given him the requisite permission; that he is leading a respectable life; that he is domiciled in Germany, and that he has the means of livelihood.

In all countries a married woman is held to be a citizen of the state of which her husband is for the time being a subject, and the naturalization of a father carries with it that of his children in minority. In countries where military service is compulsory, naturalization in avoidance of this provision either is prohibited or renders the offender liable to imprisonment, if he returns, and forfeiture of all property subsequently acquired in his native country.

Natural Selec′tion, a phrase frequently employed to indicate that process in nature by which those plants and animals best fitted for life under the conditions in which they are found, survive and spread, while others die out and disappear. Allowing for slight variations, each pair of plants or animals tends to produce more than two like themselves, and hence in time they would fill any locality with individuals requiring the same food and environment. In time they would become very much crowded, and the weaker individuals would be driven out in the so-called "struggle for existence," thus illustrating again the "survival of the fittest." Of course, natural selection does not act suddenly, but operates noticeably only in a series of many generations. Moreover, it would not be possible were the individuals of each generation exactly like their predecessors. But children are never exactly like their parents; there are always variations which are intensified more or less by the surroundings. If natural selection acts at all, it is operative throughout the whole universe, from the lowest forms of animal life to man himself. Not all scientists accept this theory in all respects. See HEREDITY; EVOLUTION.

Natural Theol'ogy, that system of theology which treats of the existence and character of God as they may be learned from reason and nature. The fundamental idea of the system is that God is revealed through his works and may be known without the aid of supernatural revelation.

Nature Study. As the term is ordinarily used, *nature study* means the study, in common schools, of natural objects, such as plants, animals, minerals and the various forms of land and water. In institutions of higher grades, these studies constitute the various branches of natural science, as geology, physics, botany and zoölogy This article is limited to nature study in the common schools.

PURPOSES. The purposes of nature study are:

(1) To train the child's powers of observation.

(2) To give him insight into the form, structure, characteristics and uses of all objects of nature, especially those belonging to the vegetable and animal kingdoms, with which he comes in daily contact.

(3) Through this acquaintance to lead the child to form a right attitude towards all objects which affect his life, to use all things economically, to prevent waste and destruction and to be kind to insects and animals.

(4) To lead the child to see the relations of various subjects to one another, as the relation of plant life to animal life and the dependence of occupations upon the geographical conditions of the locality in which he lives.

(5) To give the child the power to discover things for himself.

(6) To show the connection between the work of the school and the work of the home.

PLAN. With the exception of those children living in the congested portions of large cities, all children have some knowledge of the plant and animal life of their locality and of the different forms of water, as vapor, ice and snow; but their observation has not been systematic, and much of their knowledge is unclassified. The first work of the teacher is to train her pupils to habits of systematic observation. This may be accomplished by observing the following plan of procedure:

(1) With young children, especially those in the first and second grades, study objects as wholes. If the object is a pansy, use the entire plant.

(2) Question skilfully, so as to direct the pupil's attention to the facts in the order in which they should be learned, so as to enable him to see the relation of these facts to one another.

(3) Lead the pupil to discover for himself the facts which he should learn. He should not be told what he can learn from his own observation.

(4) Let each lesson depend as much as possible upon what has been learned in previous lessons.

(5) Secure from the pupils definite statements, in good English, of the facts they have learned.

(6) Lead the pupils to discover the uses of the objects studied.

(7) Keep the work within the capacity of the class. In the first three grades minute analysis of objects should not be attempted. Children in these grades easily grasp the relations of the large parts of an object, as the root, the stem, the leaves and the blossom of a plant, but they are not prepared for the study of the parts of these different organs. Besides, there is much more profitable work that they can do in these grades. The children of the third grade will enjoy studying attachments of seeds, by which they are scattered, and in spring, the germination of beans, peas, corn, squashes, pumpkins or other large seeds.

The plan outlined above for primary grades constitutes the foundation of work in more advanced grades. The teacher should adhere to the principles here set forth and elaborate upon the plan as the needs of the class require.

MATERIAL. In the selection of material the teacher should be guided by the locality the season and the conditions of her class. She should select the material with a view to reaching a definite end through the nature study work. In the autumn the preparation of plants and animals for winter is a theme which affords many interesting lessons, such as the withering and falling of the leaves, the ripening of fruit, the scattering of seeds, the migration of birds, the storing up of food by some animals and the burrowing by others. During winter the study of frost, ice and snow and the weather will furnish many lessons of interest to the younger pupils, while the older ones may be interested in studying the bark, wood and plan of branching of the different trees common to the locality. In the spring, the awakening of life in the plant and animal kingdoms is of interest to all. In rural schools the study of the life history of insects injurious to vegetation and of means for preventing their ravages is not only an interesting, but also an exceedingly practical and profitable, line of work. The ingenious teacher will find means to use profitably the abundance of material at her disposal.

Preparation. The teacher should possess a good text-book on each of the following subjects: botany, zoölogy, physiology and physical geography, and she should have a work which describes the most common minerals. These can be obtained through any dealer and are inexpensive. Educational journals also contain much valuable material which will assist in nature study work. Many articles in this encyclopedia will be found helpful. See Apple; Germination; Rose; Butterfly; Robin; Silkworm, and other kindred topics. The teacher should also become familiar with the literature especially suited to nature study, and in connection with the study of plants and animals suitable poems and memory gems should be taught.

There are scores of books on nature study, treating of both material and methods. Some of the best of these are Flagg's *A Year Among the Trees*; Newell's *Outlines of Botany*—Part I, *From Seed to Leaf*; Part II, *Flower and Fruit*; Dana's *How to Know the Wild Flowers*; Arnold's *Waymarks for Teachers*; Hale's *Little Flower People*; McMurry's *Special Method in Natural Science*; Ballard's *Among the Moths and Butterflies*; Burroughs's *Birds, Bees and Bright Eyes*; Morley's *Insect Life*; Dugmore's *Bird Homes*; Flagg's *A Year with Birds*; Lange's *How to Know One Hundred Wild Birds of Illinois* (the same author also has similar books for Indiana, Missouri, Minnesota and Wisconsin); Olive Thorne Miller's *The First Book of Birds* and *The Second Book of Birds*. *Birds of Our City Parks* treats of the birds about Chicago, and other large cities have similar works for the birds of their respective localities.

Nature Worship, a crude form of religion, founded upon the belief that the objects of nature possess minds and wills and the power to help and to harm mankind. In such worship the object may be regarded as itself a divinity or as being the abode of a divinity.

Nau'gatuck, Conn., a town and borough in New Haven co., 17 mi. n. w. of New Haven, on the Naugatuck River and on the New York, New Haven & Hartford railroad. It has a memorial library, the Salem School, Sacred Heart Academy and a good high school, and it contains manufactories of India rubber goods, knit underwear, malleable iron and other articles. There is also a considerable trade in tobacco and other farm products. The place was incorporated as a town in 1844 and as a borough in 1893. Population in 1900, 10,541.

Naupak'tos. See Lepanto.

Nausea, *naw'she a* or *naw'sha*, the sensation of sickness, or inclination to vomit, similar to that produced by the motion of a ship at sea. Though the feeling is referred to the stomach, it frequently originates in disorder of other and remote parts of the body, such as the brain or kidneys.

Nautical Almanac. See Almanac.

Nautilus, a genus of animals, related to the cuttlefish, possessing shells of many chambers. The shell of the pearly nautilus, an inhabitant of tropic seas, is a spiral with smooth sides; the turns, or whorls, lie one outside another and are separated into chambers by thin partitions. The animal always lives in the cavity of its outermost, or external, chambers, and the others, which have been its previous dwelling places, contain nothing. The chambers are connected by a tube, through which they may be filled with air or water, and thus the nautilus is able to rise or sink. The animal which has been said to sail its shell upon the surface of the water, is the *paper nautilus*, or argonaut.

Nauvoo', a town of Hancock co., Ill. See Mormons.

Navaho or **Navajo**, *nah'va ho*, a tribe of indians numbering in 1900 about 20,000, many of whom are engaged in civilized pursuits. They occupy a reservation in the northwest of New Mexico and the northeast of Arizona. The women are skilled weavers and make fine blankets; they also till their fields and tend their stock.

Na'val Acad'emy, United States, a national school established at Annapolis, Md., in 1845, by special act of Congress, for the purpose of giving instruction to officers for the United States navy. The origin of the school is due to the historian George Bancroft, who, when secretary of the navy, urged the establishment of a school for training naval officers. The course of study covers six years, four of which are spent at the academy and two at sea. A cadet has the title of midshipman, and the graduates are given the rank of ensign. The course is very thorough and includes all branches necessary to make the graduates full-fledged seamen; a complete course for engineers prepares for marine, electrical and ordnance work. The graduates must be navigators and surveyors and have a good knowledge of English, French and Spanish. They are also required to become thoroughly conversant with the Constitution of the United States and with international law. From June to September the cadets are given practice and training on board ship, where they learn practical navigation. During the last two years they are trained in the duties of officers, and on account of the scarcity of officers in the navy within recent years, graduates have often been called upon to perform duties and assume responsibilities beyond what their commissions require. Two cadets are allowed for each senator, representative and delegate in Congress, two for the District of Columbia, five each year for the United States at large and one for Porto Rico, who must be a native of the island. This last appointment is made by the president, on recommendation of the governor of Porto Rico. The congressional appointments are made by the president through recommendations of senators and representatives, and those for the District of Columbia and the United States at large, by the president. Admission is by competitive examination. The administration of the academy is vested in a superintendent, who is a naval officer of high rank and is detailed to the duty by the secretary of war. The old buildings have recently been remodeled and new ones are being erected at an expense of $8,000,000. The United States Naval Academy now ranks as the largest and best-equipped institution of the kind in the world. See Navy, subhead *United States.*

Naval Observatory, *ob zurv'a to ry,* an astronomical observatory established at Washington, D. C., under the supervision of the bureau of equipment in the navy department. The buildings are on Georgetown Heights and comprise an office building and observatories for the various astronomical instruments used, chief among these being the 26-inch equatorial telescope, which was placed in position in 1874 and was at that time the largest instrument of its kind in the world. There are also transit instruments, astronomical clocks, photoheliographs and various other pieces of intricate apparatus. The library contains 20,000 volumes and a large number of pamphlets. The work of the observatory consists largely in following up discoveries that have been made in other observatories and making them practical. It also prepares the nautical almanac and issues numerous reports and articles pertaining to astronomical subjects. The United States Naval Observatory is one of the great institutions of its kind in the world and ranks with the observatories at Greenwich and Pultowa.

Naval Reserve, a force of men, in addition to the regular naval forces, who are trained and instructed in naval affairs, that they may be of service in time of war. In some countries during times of peace they are employed in the merchant marine and in life-saving service. In others they are given periodical seasons of training, being allowed to pursue other work in the intervals. The naval reserve of the United States consists of bodies of naval militia of the states, stationed at points on the sea coasts and on the Great Lakes, under the indirect control of the navy department, whose orders are executed by the governor and adjutant general of the state. This force includes about 5000 men. This branch of the naval service will doubtless be extended in the near future.

The naval reserve of Great Britain consists of about 45,000 men and officers, who are drilled on special drill ships or on vessels of the regular navy, assigned for the purpose. They are paid a small fee and are given regular pay during actual service. The same system in general obtains in France, Germany, Russia and Italy, though in several of these countries men who have completed a full term of naval service are also members of the reserve.

Naval Schools of Instruction, schools established for training the officers and men of a navy. Naval schools are maintained by all the leading nations, and in their general plan and requirements for admission they quite closely resemble one another, though they differ widely in details and in the method of promotion after the students have left the schools. In the United States the naval schools of instruction consist of the United States Naval Academy, the Naval War College, the Naval Torpedo School, schools for training apprentices and gunnery training schools. The academy is at the head of the system (See NAVAL ACADEMY, UNITED STATES). The Naval War College is located at Newport, R. I.; it instructs officers in their regular duties and also in the preparing of plans for naval operations. The Naval Torpedo School is on Goat Island, Newport Harbor. The schools for training enlisted men are at Newport, San Francisco, Port Royal, S. C., and Lake Bluff, Ill. The courses in these training schools are elementary and do not prepare the men to become officers.

Navarre, *na vahr'*, a province and former kingdom of Spain, bounded by Aragon, old Castile, the Basque provinces and France. Its area is about 4055 square miles. Extensive forests clothe the slopes of the Pyrenees, which traverse the country, and the lowlands produce wheat, maize, wines, flax and hemp and afford abundant pasturage for cattle. Iron, copper and lead are among the minerals. The capital is Pamplona. The ancient kingdom of Navarre comprised both the modern province, sometimes called Upper Navarre, and also Lower Navarre, separated from the former by the Pyrenees and now included in the French Department of Basses-Pyrénées. Ferdinand the Catholic annexed Upper Navarre to Castile in 1512, while the northern portion passed with Henry IV to the crown of France.

Navarro, *na vah'ro*, MADAME. See ANDERSON, MARIE ANTOINETTE.

Nave, in Gothic architecture, the middle part of a church, extending from the western entrance to the transept or to the choir and chancel, according to the nature and extent of the church. It is usually flanked by one or two aisles, which are narrower and lower than the nave. According to the original meaning of the term, the nave is that part of the church which is farthest away from the sanctuary, namely, the so-called western part.

Naviga'tion, the science of conducting ships or vessels from one place to another; more especially the art of directing and measuring the course of ships and of determining their position by observation and computation. The direct management of the sails, the rudder, the engines and the working of the ship generally, though essential to navigation, are usually classed as seamanship. In order to navigate a ship successfully, it must not only be a perfect machine, but it must be supplied with accurate charts and plans of ports and harbors, with compasses, chronometer, sextant, log and the various mathematical instruments by which observations can be taken and computations made. It is by the compass that the direction which the ship sails or should sail is determined. Though the compass points in a northern direction, it does not always point to the true north, and its variation must be taken into account (See COMPASS; DECLINATION). The rate of speed at which a vessel is sailing is found by the log, which is heaved usually at the end of every hour (See LOG). The position of the ship may be obtained by noting the rate and direction of sailing and the distance which has been covered (See DEAD RECKONING). But the more accurate way is by taking observation of the heavenly bodies with the sextant and comparing these with data given in the *Nautical Almanac*, relying upon the correct Greenwich time, which is given by the chronometer. The science of trigonometry is involved in navigation, but the operations can be much shortened by tables and instruments. In directing a ship's course and applying it on a chart, several methods of what are called *sailings* are employed.

Navigation Acts, a name given to several acts passed by the British Parliament in 1645 and the years following, in order to protect British commerce, to injure the shipping interests of the Dutch and to exploit the British colonies. Parliament had enacted such laws as early as the reign of Richard II (1377–1399), but they had never been seriously enforced. The so-called First Navigation Act, passed in 1645, confirmed and enlarged in 1651 and again strengthened in 1660, enacted that all products of growth, production or manufacture from any country in the world should be imported into England only in ships built in England or in her colonies and manned by Englishmen. The so-called Second Navigation Act was passed in 1663; it levied prohibitive duties upon goods imported into the colonies from any but British ports and required that certain important products of the American colonies should be sent directly to England. A little later, duties were imposed upon goods shipped between colonies, if the same goods could be secured in England. Before the end of the century, acts directed at the suppression of colonial manufactures were passed, and in 1719 Parliament condemned all colonial manufactures as "tending to independence." Before 1761 at least twenty-nine separate acts in restraint of colonial trade and manufactures had been passed, including one prohibiting the importation of molasses and sugar, from which the Americans manufactured rum for export. The full effect of this policy of suppression and exploitation was never felt in America, owing to the practice of smuggling, which was considered by the colonists as a legitimate business and which assumed immense proportions. Furthermore, many of the provisions of the acts were favorable to American industry, especially to shipbuilding, while certain privileges were extended to colonial producers which were denied to all others. However, the principle of restriction of trade and manufactures was vigorously denounced by the Americans, and the persistence of the British in this policy was one of the important causes of the Revolution.

Nav'igator's Islands. See SAMOA.

Na'vy, a collective term applied to the war ships of a nation, including also their crews, guns, engines and fittings (See MERCHANT MARINE). In olden times the commercial ships of a nation were safe only when protected by war vessels, and even now the great nations of the world find frequent occasions for the use of their war ships in protecting and advancing their commerce. The merchant marine and the navy of nations have in all times developed side by side—the merchant marine at the hands of individuals and corporations; the navy through the activities of the governments themselves.

For more than a century all nations have given special attention to the enlargement and improvement of their navies, and each has always been ready and willing to accept anything that will work improvement. With the invention of steamships and of heavy guns firing explosive shells, the wooden ships have been abandoned and new ships created (See ARMOR PLATE; CANNON; WAR SHIP). Every invention of modern days has been included, and the modern fighting ship uses every possibility of steam and electricity.

In the order of their importance the navies of the leading nations rank as follows: Great Britain, first; France, second; Germany, third, with a possibility of being displaced by the United States; United States, fourth; Italy, fifth; Japan, sixth, and Russia, seventh. Of the South American states Argentina ranks first.

UNITED STATES. The American navy was begun in 1775, when Washington detailed some of his troops to blockade Boston Harbor against British vessels, and it gained some reputation during the Revolution by the combat between the *Bon Homme Richard,* under John Paul Jones, and the British ship *Serapis* (See JONES, JOHN PAUL). During the War of 1812 American seamanship won the admiration of the world, and the names of Perry, McDonough, Lawrence and others became household words in American homes.

The president of the United States is commander in chief of the United States navy, but he acts through the secretary of the navy, who is a member of his cabinet (See NAVY, DEPARTMENT OF). The maneuvers of fleets and the science of naval warfare are under the charge of a general board, which resembles somewhat the general staff of the army. Including the marine corps, there are about 37,000 men in the American navy, and over ninety per cent of them are Americans by birth or naturalization. The enlisted men are better treated than in most navies, and sometimes they are promoted to the ranks of commissioned officers. Commissioned officers are educated at government expense (See NAVAL ACADEMY, UNITED STATES), and there are other schools for enlisted men. Recently a school for the training of youths has been established by the government at Lake Bluff, Ill. The cost of the navy increases somewhat from year to year, and it already exceeds $100,000,000 a year. The first important ships built after the reorganization of the navy in 1881 were the *Atlanta*, the *Boston* and the *Chicago*, which have since been remodeled as protected cruisers. The second-class battleships *Maine* and *Texas* were then built, and after them the battleships and armored cruisers which at Manila and Santiago in 1898 reëstablished the reputation which the American navy had gained in the War of 1812. The number of ships in the navy is continually increasing under government appropriations. In 1906 the navy included 25 first-class battleships, ranging from 10,000 to 16,000 tons displacement and from 15 to 19 knots in speed, each carrying four 12- or 13-inch guns and large batteries of 6-, 8- or 10-inch guns, all protected by 9- to 18-inch armor belts; each of these vessels represents an average cost of $3,000,000. The navy also had one second-class battleship; 12

armored cruisers, of from 9000 to 15,000 tons displacement, mounting 8- or 10-inch guns in the main batteries and averaging 22 knots in speed; 10 coast defense monitors, carrying 10- and 12-inch guns; 50 gunboats and small cruisers; 16 torpedo boat destroyers; 35 torpedo boats of various speeds up to 30 knots per hour, and 8 submarine torpedo boats. A large number of river gunboats, training ships, tugs, naval yachts in use by naval militia companies, colliers and hospital, repair and supply ships may also be included in the navy list.

The navy is divided into a powerful North Atlantic fleet, made up of three squadrons; an Asiatic fleet of slightly inferior strength, also made up of three squadrons, and the smaller squadrons in the South Atlantic, at the European station and on the Pacific coast. The chief naval stations are at Brooklyn, Norfolk, Puget Sound and Mare Island (near San Francisco). Outlying stations in Porto Rico, the Philippines, Samoa, Hawaii and at Guam add greatly to the cruising power of the fleets. See SUBMARINE BOAT; TORPEDO; TORPEDO BOAT; TACTICS, subhead *Naval Tactics*.

GREAT BRITAIN. The British navy is directed by a board of six members, known as the lords of admiralty. The first lord is a member of the British cabinet, and one of the others is commander in chief of the navy. The various departments of construction, repair, training and supply are permanently in charge of expert officers. The enrollment of officers and men exceeds 130,000, besides 20,000 marine reserves in training, a force of naval reserves and a body of men in the merchant service to whom naval training is given. The government maintains a number of technical schools for the instruction of officers. In 1906 the navy included 56 battleships, most of which were first-class; 42 armored cruisers, 231 sea-going gunboats and army cruisers, 146 torpedo boat destroyers, over 200 torpedo boats, about 20 submarines, and a large supply of transports, hospital ships and repair ships. The entire fleet mounts over 2000 heavy guns and about 10,000 smaller cannon.

FRANCE. The head of the French navy is the minister of marine, who is responsible to the chamber of deputies and is assisted by an advisory council. In 1906 the navy contained 36 battleships, 14 coast defense ships, 23 armored cruisers, 83 sea-going gunboats and entire armored cruisers, over 30 torpedo boat destroyers, 240 torpedo boats and 40 submarine torpedo boats. The fleets mount 800 heavy guns and 4500 smaller cannon.

GERMANY. The German emperor is at the head of the navy and is assisted by a cabinet of naval officers. In 1906 the navy included 22 first-class battleships, 27 coast defense vessels and smaller battleships, 7 armored cruisers, about 50 smaller cruisers and gunboats, over 40 torpedo boat destroyers and 100 torpedo boats. The fleet mounted about 400 heavy cannon and 2000 smaller guns.

JAPAN. The Japanese navy is under the administration of the minister of marine and his cabinet. Notwithstanding the losses in the war with Russia, the navy came from the struggle with greatly increased tonnage and strength, due to captures and to the constant activity in shipbuilding. In 1906 it contained 11 battleships, several coast defense vessels, 9 armored cruisers, 30 gunboats and smaller cruisers, about 20 torpedo boat destroyers and nearly 100 torpedo boats and 11 submarines.

OTHER NATIONS. The Italian navy has 19 battleships and 6 armored cruisers. The Russian navy was reduced one-half during the Russo-Japanese War, but plans have been made for its rapid rebuilding, on a larger scale than before. The Austrian navy contains about a dozen battleships of small size.

Navy, DEPARTMENT OF THE, an executive department in charge of naval affairs of the United States government. At the head is the secretary of the navy, who is a member of the president's cabinet, and under him are various bureaus and officers. Among these are the chief of yards and docks, the chief of ordnance, the paymaster general, the surgeon general, the chief of construction, the chief of navigation, the judge-advocate general and the commandant of the marine corps. The chief of equipments has charge of the equipment and coaling of ships and the general supervision of the Naval Observatory, the *Nautical Almanac* and the hydrography bureau, which is concerned with the construction of sailing charts and maps. The chief of navigation has charge, among other things, of naval education (See NAVAL ACADEMY, UNITED STATES); the judge-advocate general supervises courts-martial, boards of inquiry and other legal affairs. The chiefs of bureaus serve four years and form a kind of advisory cabinet to the secretary. A bureau of fish and fisheries makes a constant study of marine life, in the interest of the fishing industry. See NAVY.

Naz'arenes, a designation given to the early Christians, from the town of Nazareth, where Christ dwelt. The name was also applied to a sect which arose at the end of the first century and existed chiefly in Egypt. They are supposed to have retained adherence to the Mosaic law and to have held a low opinion about the divinity of Christ.

Naz'areth, a small town in Palestine, 17 mi. s. e. of Acre, celebrated as the residence of Jesus during his youth. It is surrounded on all sides by hills. The houses are of stone, well built, with flat roots, and the principal edifices are the conventual buildings of the Franciscan monks, which include the Latin Church of the Annunciation, supposed to mark the spot where the house of the Virgin Mary stood. The population is about 11,000.

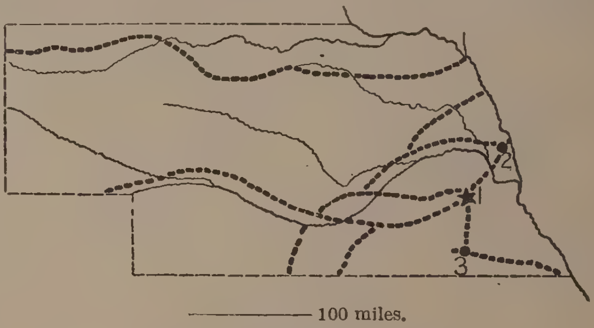
Naz'arites, among the ancient Jews, persons who devoted themselves to the peculiar service of Jehovah for a certain time or for life. The law of the Nazarites is contained in *Numbers* VI, 1-21.

Nebraska, the *Tree Planter State,* one of the central western states, located near the geographical center of the Union. It is bounded on the n. by South Dakota, on the e. by Iowa and Missouri, on the s. by Kansas and Colorado, and on the w. by Colorado and Wyoming. Its length from east to west is 450 mi. and its width from north to south, 208 mi. The area is 77,510 sq. mi., of which 670 sq. mi. are water. Population in 1900, 1,068,539.

Surface and Drainage. Nebraska forms a section of the eastern slope of the great plains, and rises, at an average of about 10 feet to the mile, from an elevation of 850 feet, at the southeastern corner, to more than 5000 feet, on the western boundary, where the foothills of the Rocky Mountains begin. The altitude exceeds 5300 ft. at the highest point in the northwest part of Banner County. The average elevation of the state is about 2500 feet. The surface is rolling prairie through which rivers have worn wide and deep channels. Along the Missouri and the Platte are numerous high bluffs, and in the northwestern corner of the state is found a section of the Bad Lands, which occupy a larger area in South Dakota. These lands consist of bluffs that have been fantastically worn by wind and water into many curious and interesting shapes. They constitute one of the richest fossil regions of the world.

The state is drained directly or indirectly into the Missouri which forms a part of the northern and all of the eastern boundary line. A height of land, extending irregularly from the eastern to the western boundary through the northern tier of counties, separates the streams that flow directly into the Missouri from those that flow into the Platte. The Niobrara, flowing eastward along the northern part of the state with its short, spring fed tributaries, forms one of the most picturesque regions of the continent; there are in its basin near Valentine 15 beautiful waterfalls, the highest of which are the Arikaree and the Parry, each with a precipice of 90 ft.

The Platte, formed by the North Platte, which enters the state near the middle point of the western boundary, and the South Platte, which enters it from Colorado, flows across the southern and central parts of the state to the Missouri. Its principal tributary from the north is the Loup, which receives the South Fork Loup, the Middle Loup and the North Fork Loup and drains a large portion of the central and southern part of the state. The Elkhorn enters the Platte from the north, a few miles before it reaches the Missouri. The Republican River flows through the southern tier of counties, from west to east, about three-fourths of the distance across the state, and then enters Arkansas, and the southeastern counties are drained by the Nemaha and tributaries flowing into the Missouri. A number of large and important lakes are found in Holt, Brown and Cherry counties.



NEBRASKA
1, Lincoln; 2, Omaha; 3, Beatrice.
Dotted lines indicate chief railroads.

Climate. The climate is warm temperate and is characterized by the sudden changes common to inland regions. On the whole it is agreeable, exhilarating and healthful. The atmosphere is dry, and gentle winds prevail. The mean temperature is about 21½° for January and 74½° for July, but the thermometer sometimes falls in winter as low as 25° below zero and rises as high as 100° during the hottest months. The nights, however, are invariably cool, and because of the dryness of the atmosphere the extremes of heat and cold are not felt as they are in a humid climate. The rainfall averages about 24 inches for the state, being over 30 inches in the eastern part and from 15 to 20 inches in the western counties. In respect to rainfall, the state is divided into three regions: the eastern, which receives an abundance of rain; the central, receiving usually enough for agriculture, and the western, which is semiarid.

Mineral Resources. The minerals are few, but valuable; building stone is found in most parts of the state, there being 200 limestone quarries in operation in 1910; a high-grade cement rock is generally distributed. Over 100 carloads of sand are daily shipped from the sand dredges. This sand is of superior quality, and much of it is used in the manufacture of artificial stone. In the south central counties there are also valuable deposits of ocher, and coal is found in the northeastern part of the state.

Agriculture. With the exception of limited areas in the northwestern and western portions, the entire state is covered with a good soil, consisting of loam mixed with sand underlaid by a porous layer of sand or gravel. Corn is the leading crop and occupies nearly one-half of the acreage under cultivation. This is followed, in order of their importance, by wheat, oats and rye. Sugar beets are raised in large quantities, and Nebraska is becoming one of the important states in the production of beet sugar. Stock raising is practiced throughout the state, though it receives relatively greater attention in the western part, where the natural grasses mature and support live stock through the winter with little or no additional feed. Large numbers of horses and mules are raised for market, and cattle, hogs and sheep are fattened for slaughter. Dairy husbandry also is an important branch of agricultural industry.

Manufactures. Nebraska is not a manufacturing state, though certain industries have received considerable attention. Chief among these is slaughtering and meat packing, the center of which is at South Omaha, which is the third city in importance in this industry in the union. The second manufacturing industry of importance is the making of flour and other grist mill products. Large quantities of starch are made, and there are numerous factories for canning fruits and vegetables and for the manufacture of beet sugar. The making of butter and cheese also receives considerable attention. Printing and publishing is an important industry, and the manufacture of cars and other railway appliances is being rapidly developed.

Transportation and Commerce. The state is well provided with railroad transportation facilities. In all, the state has about 10,000 miles of railways. Carriage roads are generally good. The Missouri is navigable, but the construction of railways has rendered it of little use as a waterway.

Nebraska exports large numbers of horses, cattle, sheep and hogs; also large quantities of dressed meat, flour and wool. It imports those manufactured products necessary to the needs of an agricultural population.

Government. The legislature consists of a senate of 33 members and a house of representatives of 100 members, each elected for two years. The legislature meets biennially, and the session is practically limited to sixty days. The executive department consists of a governor, a lieutenant governor, a secretary of state, an auditor, a treasurer, a superintendent of public instruction, an attorney-general and a commissioner of public lands and buildings, each elected for two years. The judicial department embraces a supreme court, district courts and county courts. The supreme court comprises seven judges, elected by popular vote for six years. The district courts are held in twenty-six districts, in each of which the judge is chosen for four years. County courts have probate and limited civil and criminal jurisdiction; the judges are elected for two years.

Education. The state maintains an efficient system of public schools, and its percentage of illiteracy is extremely low. The school fund is obtained from the interest on the money provided by the sales of public lands, from a state tax, from fines, from forfeitures and from local tax. The state university and agricultural college at Lincoln is at the head of the school system. There are two state normal schools, one at Peru and the other at Kearney; the legislature of 1909 ordered the establishment of two additional schools. Besides these, there are a number of important colleges and secondary schools supported by various denominations.

Among these are Wesleyan University, Cotner University, University of Omaha and the colleges of Creighton, Bellevue, Doane, Hastings and Grand Island.

INSTITUTIONS. The school for the deaf and dumb is at Omaha, that for the blind is at Nebraska City, and the institute for the feeble-minded is at Beatrice. The asylums for the insane are at Lincoln, Norfolk, and Hastings. There are sailors' and soldiers' homes at Grand Island and Milford; also, a home for friendless children at Lincoln. The penal institutions consist of a state industrial school for boys at Kearney, a girls' industrial school at Geneva, an industrial home at Milford and a state penitentiary at Lincoln.

CITIES. The chief cities are Lincoln, the capital, Omaha, South Omaha, Fremont, Grand Island, Nebraska City, Beatrice and Hastings.

HISTORY. Nebraska was probably visited by Coronado as early as 1541, and in 1673 the Platte and Missouri districts were mapped out by Marquette. The present state formed a part of the Louisiana Purchase of 1803, and in 1804-1805 it was visited by Lewis and Clark. As early as 1825 white settlement was begun, the first towns being founded at Omaha and Nebraska City. After a long struggle, in which slavery played an important part (See KANSAS-NEBRASKA BILL), Nebraska was established as a territory in 1854, including parts of Dakota, Montana, Wyoming and Colorado. In 1863 it was reduced to its present limits. Nebraska became a state in 1867, and Lincoln was made the capital in the same year. The struggle for statehood was prolonged by differences between President Johnson and Congress over the state constitution. At the close of the Civil War negro suffrage was a prominent question and this entered into the Nebraska constitution. The bill admitting the territory, which passed Congress in 1866, was vetoed by the President, but the next year a similar bill was passed over his veto. The state has had almost continuous prosperity, interrupted only by occasional Indian uprisings. Consult *Barrett's History and Government of Nebraska.*

Nebraska, UNIVERSITY OF. It comprises seven colleges: the graduate college, the college of arts and sciences, the teachers' college, the college of engineering, the college of agriculture, the college of law and the college of medicine. In addition to these the University embraces the schools of pharmacy, fine arts, and music. The total enrollment is 4000 and the faculty numbers 300. The University library contains 85,000 volumes. The University maintains a summer session and has intrusted to its charge the United States Agricultural Experiment Station, the state museum, the botanical and geological surveys and the superintendency of farmers' institutes.

Nebraska City, NEB., the county-seat of Otoe co., on the Missouri River, about 40 mi. s. of Omaha, and on the Missouri Pacific and the Chicago, Burlington & Quincy railroads. The city is in an agricultural region which produces fine fruits, considerable corn and other grains. There are large stockyards, grain elevators, flour, lumber and planing mills, packing houses, foundries, plow works and other factories. A state institution for the blind is located here, and the city has a Federal building and a public library. It was settled on the site of old Fort Kearney in 1855 and was incorporated as a city in 1871. Population in 1900, 7380.

Nebraska River. See PLATTE.

Nebuchadnezzar, *neb'u kad nez'zur,* king of Babylon from 604 to 561 B. C., the son of Nabopolassar. After defeating Necho, king of Egypt, he subjugated Syria and Palestine, carrying off with him the sacred vessels of the Temple and the chief Jews into captivity. He destroyed Tyre in 585, and some years later he invaded and ravaged Egypt. During the peaceful years of his reign he rebuilt in a magnificent manner Babylon and many of the other cities of the Empire, and constructed vast temples, aqueducts and palaces, whose ruins still testify to his grandeur. Several inscriptions relating to his reign have recently been found.

Neb'ula (plural, *nebulae*), a white cloud-like patch of light seen in the heavens, always in the same position. Two nebulae are visible to the naked eye, the one in Orion being the larger. Many others are visible through the telescope, and about ten thousand are now known. A large number of these are known to be clusters of stars. On the other hand, the spectroscope has shown that many nebulae, among which are several that had hitherto appeared to be well authenticated clusters, consist, in part at least, of masses of incandescent gas. The recent researches of Mr. Norman Lockyer render it probable that nebulae include clouds of meteors, which, by their continual impact against one another, produce the heat, light and gaseous matter that are detected by our telescopes and spectroscopes. It may be that here are new systems in process of formation. See NEBULAR HYPOTHESIS.

Nebular Hypoth'esis, a theory advanced by Laplace to account for the formation of our solar system. The theory supposes that the bodies composing the solar system once existed in the form of a nebula; that this had a revolution on its own axis, from west to east; that, the temperature gradually diminishing, the nebula contracted, the rotation increased in rapidity and zones of nebular matter were successively thrown off, in consequence of the centrifugal force overpowering the central attraction. These zones, being condensed, and partaking of the primary rotation, constituted the planets, some of which in turn threw off zones, which now form their satellites. In this way the earth was thrown off from the sun, and the moon from the earth. Jupiter has thrown off seven such, and in its rings Saturn may show a satellite in process of formation. Though still open to certain objections, the nebular hypothesis is now generally received by astronomers.

Necho, *ne'ko,* or **Neku,** a king of Egypt, mentioned in *II Kings* XXIII, 29, and *Jeremiah* XLVI, 2. He belonged to the twenty-sixth dynasty, succeeded his father, Psammeticus I, and reigned from 610 to 594 B. C. He extended his dominions from the south of Syria to the Euphrates, defeated Josiah, king of Judah, at Megiddo, but was ultimately driven back by Nebuchadnezzar.

Necker, *na kair',* JACQUES (1732–1804), a French minister of finance. He became clerk in a Paris banking house in 1750 and afterward accumulated a large fortune as a banker. In 1777 he was made director-general of finances. Official corruption under the preceding reign had caused a large deficit, to which the American war made great additions. Necker endeavored to meet the exigency by loans and reforms, and above all, to fund the French debt and establish annuities under the guarantee of the State. His suppression of abuses had created him many enemies at court and, shortly after the publication of his famous account of the conditions of the treasury, he resigned and retired to Switzerland. The errors of Calonne, who next had the management of the State finances, increased Necker's reputation, and in 1788 he was recalled. In 1789 the advisers of the king succeeded in inducing him to give Necker his dismissal, and to order him to leave the kingdom. No sooner was his removal known than all Paris was in a ferment. The storming of the Bastille followed, and the king found himself compelled to recall the banished minister. Necker's return to Paris resembled a triumphal procession. His first object was to restore tranquillity and security of person and property. But he was not equal to the political, or even the financial, crisis, and he resigned in September, 1790. Necker's daughter was the well-known Madame de Staël. See STAËL-HOLSTEIN, ANNE LOUISE GERMAINE.

Necromancy, *nek'ro man sy,* (sometimes called the Black Art), the art of ascertaining the future by questioning the dead. Necromancy originated in the East and is one of the most ancient superstitions. It was practiced by the Greeks, and the works of Homer and other early Greek writers contain frequent references to it. It is also mentioned in the Old Testament, where it is severely censured. Necromancy was practiced by the nations of northern Europe during the Middle Ages, and later it was united with sorcery. See SPIRITUALISM.

Necrop'olis, a name originally applied to a suburb of Alexandria devoted to the reception of the dead and hence extended to the cemeteries of the ancients generally. The name has also been given to some modern cemeteries in or near towns.

Nectar, *nek'tur,* in Greek mythology, the drink of the gods, one of the means by which they retained their eternal youth. See AMBROSIA.

Nectarine, *nek'tur in,* a fruit which differs from the peach only in having a smoother rind and firmer pulp, being indeed a mere variety of peach. See FRUITS, *color plate,* Fig. 13.

Needle, a small instrument of steel, pointed at one end and having, at the other, an eye, or hole, through which is passed a thread. The needle is used for sewing. The earliest needles were made of bone, ivory, wood and bronze. The first steel needles were made in Nuremberg, in the latter part of the fourteenth century, and until the last half of the nineteenth century needles were made almost wholly by hand.

The principal steps in making needles are as follows: The wire, which comes to the manufacturer in coils, is cut into pieces of the length of two needles, called *blanks.* The blanks are then straightened by being rolled on a stone or iron table, after which they are pointed by being fastened to a rubber band, so arranged as to give them a rolling motion while the ends are brought against a rapidly revolving grindstone. From fifty to sixty needles can be pointed at once. After pointing, the blanks pass to a machine which slightly flattens them in the middle and marks the places for the eyes. A second machine punches the eyes, and the needles are then strung on two wires, one through each set of eyes. After stringing, they are cut apart between the eyes, leaving each wire with a set of needles strung upon it. The heads and eyes are then finished, and the needles are tempered, polished, sorted and placed in packages for the market. Notwithstanding all of the machines now used in the manufacture of a needle, it passes through the hands of seventy workmen before the process is completed. England is the leading country in the manufacture of needles, and those of the best quality are made there. Most of the needles used in the United States are of English make.

Needles for knitting, crocheting, jacquard loom weaving, sewing machines and various other purposes have their size and form adapted to the use for which they are constructed.

Needle Ore or **Bismuth Glance,** a native sulphide of bismuth, lead and copper, occurring imbedded in quartz, in long, thin, steel-gray crystals, marked with vertical lines and apparently in four or six-sided prisms. It usually accompanies native gold.

Nee′nah, Wis., a city in Winnebago co., 14 mi. n. of Oshkosh, on Lake Winnebago, at its outlet into the Fox River, and on the Chicago & Northwestern, the Chicago, Milwaukee & Saint Paul, the Wisconsin Central and other railroads. It forms with Menasha practically one industrial center. The river furnishes good water power, and the manufactures are stoves, flour, paper, lumber and other articles. It contains several public parks and is an attractive summer resort. The place was settled in 1846, was incorporated in 1850 and was chartered as a city in 1873. Population in 1905, 6047.

Neg′ative Quantity, a term applied to quantities opposite in character to others which are arbitrarily termed positive. For instance, if credit is positive, debt is negative; if distance to the right is positive, distance to the left is negative; if a body at a high potential of electricity is positively electrified, one at a low potential is negatively electrified. The sign + before the expression of a quantity indicates that that quantity is positive. The sign — indicates that it is negative. In mathematics the conception of a negative quantity is necessitated by the frequent occurrence of such expressions as 4 — 6. This, when read "Take six units from four units," expresses an impossible operation. When read, "Find the number which, added to six, will give four," it also expresses an impossible operation, if only positive numbers be considered. But we may conceive of numbers opposite in character from positive numbers, so that when added to a given number they cause it to diminish rather than increase. These numbers are called negative. Thus, mathematicians find it necessary to imagine a whole series of numbers beginning at zero and proceeding, in the opposite direction from positive numbers, to infinity. See Algebra; Imaginary Quantity; Number.

Negau′nee, Mich., a city in Marquette co., 3 mi. e. of Ishpeming, on the Chicago & Northwestern, the Duluth, South Shore & Atlantic and other railroads. It is in the iron-producing region of the state, on a high ridge known as Iron Mountain. Iron mining and shipping is the principal industry, and lumbering is also carried on. The place was settled in 1870 and was incorporated three years later. Population in 1904, 6797.

Negligence, *neg′li jens,* in law, the omission to do that which ought to be done. When such want of care results in injury to another or when it involves a wrong done to society, it renders the guilty party liable either to an action for damages or to trial for misdemeanor. In law there are recognized three degrees of negligence; *ordinary,* the want of ordinary care or diligence; *slight,* the want of great care or diligence, and *gross,* the want of slight care or diligence. An alleged act of negligence must always be the proximate cause of the injury sustained; but any injury caused to a person by another who at the time is exercising due care is not actionable. The question of negligence is usually one for a jury, and the burden of proof rests on the plaintiff, except when the thing resulting from the negligence speaks for itself. A master is responsible for the negligence of his servants. In no case can redress be had where the plaintiff is shown to have been guilty of contributory negligence. So, if a person, in crossing a track, were struck and injured by a train, he would not be able to collect damages if it were shown that he had not taken due care in crossing, even if the train crew were also negligent.

Negotiable, *ne go′she a b′l,* **In′struments,** written contracts which can be transferred. A distinction is made between *negotiable* instruments and *assignable* instruments. The former are enforceable by the transferee in his own right, without the risk of being met by any defense that would have held good against the transferrer. The latter gives to the transferee only such rights as the transferrer held. The most common forms of negotiable instruments are bills of exchange, promissory notes and checks, the common characteristic of these instruments being that they are security for, and are representative of, money. However, these instruments are negotiable only when payable to the order of a certain person or to bearer, or when endorsed by the person to whom they are payable. See PROMISSORY NOTE.

Negotiable Paper. See NEGOTIABLE INSTRUMENTS.

Negritos, *na gre'toze,* or **Negrillos,** the name given to several negro-like races inhabiting the East Indies, often confounded with the Malay race. They are dwarfish in stature, averaging from four feet six inches to four feet eight inches in height. The nose is small, flattened or turned up at the tip, and the hair is soft and frizzled. The various tribes speak distinct and mutually unintelligible dialects.

Ne'gro, EDUCATION OF THE. Previous to the Civil War, there were practically no attempts to educate the negroes in the United States. In some of the slave states, teaching a slave or a free colored person to read and write was made a crime punishable by fine and imprisonment. During the Civil War a large number of colored men entered the Union army, and many of these were taught to read and write before they were discharged from the service. But the number was so small, compared with the entire colored population, and their education was so limited, that the influence of this work was not far-reaching.

The abolition of slavery made the education of the negro a national problem. The first movements toward this education were by the church societies of the Northern states, and under the influence of one of these, the Hampton Institute was established in 1861 (See HAMPTON NORMAL AND AGRICULTURAL INSTITUTE). Under the direction of these societies, thousands of young men and women from the Northern states entered the South and engaged in teaching the colored children and youth. The government early began the work in the establishment of the Freedmen's Bureau, which was organized in 1865 (See FREEDMEN'S BUREAU). During the five years of its existence, this bureau devoted a large part of its energy and income to the establishment of common and secondary schools for negroes. Several wealthy men also contributed large sums, the income of which was to be applied to education in the former slave states (See PEABODY EDUCATIONAL FUND; SLATER FUND).

The combined efforts of all these agencies succeeded in placing the movement for educating the negroes on a sure foundation between 1865 and 1870. At an early date it was seen that much better results could be accomplished if people of the colored race were trained to teach in colored schools, and between 1868 and 1878 a number of normal schools and colleges were established, the greater part of whose work was to train teachers. As fast as the Southern states were reorganized, school systems patterned after those in the North were instituted, and in these provision was made for separate schools for white and colored children.

But notwithstanding all these efforts, the education of negroes has been attended with many difficulties. Foremost among these has been lack of adequate support from public funds. The slaveholding states were financially and industrially ruined by war, and for several years it was well-nigh impossible to obtain public funds for any purpose. Another serious obstacle at first was the opposition of the white people of the South to the education of the negro. It was not unnatural that a population which, for more than 200 years, had considered the education of the negro a crime, should look upon it after the slaves were freed as nothing less than a calamity. However, this opposition gradually grew less as the results of education were seen. Another obstacle to progress was in the mistakes made by the early teachers in these schools. It was natural that they should attempt to establish in the colored schools the systems of instruction to which they had been accustomed in the North. They failed to realize what has since been learned by experience—that the negro needed industrial education more than he needed literary training. In many of these early schools too much attention was given to literary culture, particularly to the study of Latin and Greek and other higher branches, to the neglect of training for the more common affairs of life.

Happily these obstacles have been gradually removed. Men prominent in business and national affairs, both North and South, have banded themselves together, under the General Educational Board and the Southern Educational Board, for the purpose of lending their influence and means to the furtherance of this work. Free public schools for colored children now exist in all the Southern states. The influence of the higher institutions of learning has been of great value, especially such institutions as Fisk University at Nashville, Howe University, Atlanta University and the normal and industrial schools at Hampton and Tuskegee. The influence of the educated colored people who have gone from these schools is beyond measure. They establish in their own localities cultured homes; they engage in business or follow a trade or profession successfully, and in many places they establish industrial schools similar to those from which they graduated. See TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE; WASHINGTON, BOOKER TALIAFERRO.

Negro Race or **Black Race.** See RACES OF MEN.

Negros, *na'grohs,* an island of the Philippines. See PHILIPPINE ISLANDS.

Ne'hemi'ah, a distinguished and pious Jew, born in captivity, who was made the cup-bearer of Artaxerxes, king of Persia. He was sent (444 B. C.) as governor to Jerusalem, with a commission to rebuild the walls and gates of that city. He accomplished his purpose, but not without difficulties, arising partly from the poverty of the lower classes and partly from the opposition of the Ammonites and other foreign settlers. The book of *Nehemiah* contains the account of his proceedings.

Neil, *neel,* EDWARD DUFFIELD (1823–1893), an American educator and historian, born in Philadelphia. He graduated from Amherst and studied for the ministry, but soon after, moving to Minnesota, took up educational work. He served as chaplain during the Civil War and was one of the private secretaries to presidents Lincoln and Johnson. In 1873 he became associated with Manchester College, in Saint Paul, serving first as its president and later as professor of history and literature. His publications were chiefly on the colonial period, and include *English Colonization of America during the Seventeenth Century, Minnesota Explorers and Pioneers* and a *History of Minnesota.*

Nel'son, a town of British Columbia, on the Kootenay River, 20 mi. w. of Kootenay Lake. It is on the Canadian Pacific, the Spokane Falls & Northern and the Nelson & Fort Sheppard railways. It is the center of the mining industry of the region and has smelters and a foundry. Population in 1901, 5273.

Nelson, HORATIO, Viscount (1758–1805), a great British admiral. At the age of twelve he entered the navy as a midshipman, and he received rapid promotion. On the outbreak of the war with the French Republic, he was made commander of the *Agamemnon,* of sixty-four guns, with which he joined Lord Hood in the Mediterranean. He assisted at the siege of Bastia and at Calvi, losing his right eye in the latter engagement. For his gallantry at the Battle of Cape Saint Vincent he was made rear admiral and was appointed to the command of the inner squadron at the blockade of Cadiz. His next service was an attack on the town of Santa Cruz, in the island of Teneriffe, which proved unsuccessful. In 1798 he was sent to the Mediterranean; he followed Napoleon to Egypt, and in the Battle of Aboukir Bay destroyed the French fleet. For disobedience to orders sent to him in July, 1799, Nelson was recalled, but in 1801 he was employed on the expedition to Copenhagen, in which he effected the destruction of the Danish ships and batteries.

When hostilities recommenced after the Peace of Amiens, Nelson was appointed to command the fleet in the Mediterranean, and for nearly two years he was engaged in the blockade of Toulon. In spite of his vigilance, the French fleet got out of port, was joined by a Spanish squadron from Cadiz and sailed to the West Indies. The British admiral hastily pursued them, and they returned to Europe and took shelter at Cadiz. On October 19, the French, commanded by Villeneuve, ventured again from Cadiz, and on the twenty-first they came up with the British squadron off Cape Trafalgar. An engagement took place in which the British were completely victorious, but their commander was wounded in the back by a musket ball and died soon afterward. His remains were carried to England and interred in Saint Paul's Cathedral.

Nelson River, a river of Canada, which issues from Lake Winnipeg and after a winding course of about 400 miles falls into Hudson Bay. Numerous rapids and falls retard navigation, but the river is navigable for about 80 miles from its mouth.

Nel'sonville, OHIO, a city in Athens co., 62 mi. s. e. of Columbus, on the Hocking River and on the Hocking Valley railroad. It is in one of the most productive coal fields of the state and contains manufactures of mining implements, car wheels and other articles. The waterworks are owned by the city. Population in 1900, 5421.

Nelum'bo, a genus of plants living in the fresh waters of the temperate parts of the world, distinguished by large, handsome flowers with numerous stamens. The best-known species is the Hindu and Chinese lotus, a magnificent flower which grows freely in the rivers and ditches of all the warmer parts of Asia, Australia and northern Africa. The canals of China are filled with it, and there its tubers are used as a vegetable. In the United States it is frequently cultivated in hothouses or in the ponds of parks and gardens where it can be protected sufficiently from the cold. A species of nelumbo, commonly called the *lotus,* or *water chinquapin,* is a native of the southern part of the United States and of certain localities in the North. It has large, yellow flowers and bears tubers which are used for food. The seeds, which are sunk in the large, fleshy, top-shaped receptacle, are also edible.

NELUMBO
Showing seeds and enlarged receptacle.

Nemean, *ne'me an,* **Games,** ancient Greek games, held in the valley of Nemea, in Argolis, where Hercules is said to have killed the Nemean lion. They recurred ordinarily every second year and were similar in character to the other Greek games. Eleven of Pindar's odes are in celebration of victors at the Nemean games.

Nem'esis, in classical mythology, the goddess of fate. She was not regarded as resembling the three fates, but represented rather the power which brought to every man his just deserts.

Neocene, *ne'o seen,* **Epoch,** a division of geologic time, used by the United States Geological Survey and including the middle portion of the Cenozoic era. It takes the place of the Miocene and Pliocene epochs of European geologists. See GEOLOGY; TERTIARY PERIOD.

Nepal or **Nepaul,** *ne pawl',* an independent state of India, in the Himalayas, north of Bengal. Its area is approximately 54,000 square miles. It contains within its boundaries some of the highest mountains in the world—Mounts Everest (29,002 feet), Dhawalaghiri (26,826) and Kunchinjunga (28,156). Although the territory is for the most part broken up by mountain ranges and narrow valleys, there are some fertile, cultivated tracts, and rice, wheat, barley, maize, sugar cane, buckwheat, tea, cotton and tobacco are produced. Pasturage is, on the whole, scarce and indifferent. The sheep and goats, however, have fine wool. The manufactures of Nepal include coarse cotton cloth, metallic goods, paper and pottery. Population, estimated at from 3,000,000 to 4,000,000. The territory of Nepal came into the hands of the Gurkhas in the eighteenth century. In 1814 and 1815 a war occurred between the Gurkhas and the British, and although the victories were not all with the British, they managed to force the Gurkhas to permit the establishment of a British residency at their capital.

Nephelin, *nef'e lin,* or **Nephelite,** *nef'e-lite,* a mineral found mixed with other substances in volcanic rocks, in small masses or veins and in six-sided crystals. It is usually white or yellow.

Nephrite, *nef'rite,* a mineral of a leek-green color, massive and in rolled pieces, remarkable for its hardness and tenacity. It was formerly worn as a remedy for diseases of the kidneys. From this circumstance it received its name, which is derived from a Greek word meaning *kidney.* It is now considered the same as jade. See JADE.

Nep'igon. See NIPIGON.

Nep'issing. See NIPISSING.

Ne'pos, CORNELIUS, a Roman author of the first century B. C., the contemporary of Cicero and Catullus. The only extant work attributed to him is a collection of short biographies. These biographies were long a favorite textbook, on account of the pureness of their language, and they have been issued in many editions.

Nep'tune, in classical mythology, the god of the sea, known to the Greeks as Poseidon. He was a son of Saturn and Rhea and a brother of Jupiter and Pluto and was regarded as inferior in power to Jupiter only. Neptune was not entirely satisfied with his share of the universe and attempted at one time to take Jupiter's kingdom from him, in punishment for which attempt Jupiter condemned him to serve for a time Laomedon of Troy. Laomedon set him to building the walls of the city, and in this he was assisted by Apollo. The treacherous Trojan king, however, refused to pay to the gods the rewards which he had promised, and Neptune, to punish him, created a great sea monster, to which a beautiful girl was sacrificed each year. This punishment continued until the monster was finally killed by Hercules. Neptune also attempted to acquire the supreme power over the city of Athens, and for this purpose he entered into a contest with Minerva, agreeing that the city should be named for the one who created the most useful gift. Minerva created the olive tree, and this was regarded as of greater benefit to mankind than the horse, Neptune's gift, and the city was accordingly named *Athens*, from Minerva's Greek name, Athene. Neptune was represented as a man of middle age, somewhat resembling Jupiter, but with less of dignity and kindliness in his aspect. He rode about over the surface of the sea in a chariot drawn by sea horses, and waves were stilled at his approach.

Neptune, the eighth planet from the sun and, so far as yet known, the outermost of the solar system, its mean distance from the sun being more than 2,600,000,000 miles. It is about 35,000 miles in diameter and about one and three-fifths times as far from the sun as Uranus, which is next nearer. Neptune is wholly invisible to the naked eye, and it is difficult to find and study through the telescope. It was discovered in 1846 in a position which had been indicated independently by two different astronomers. Many had searched for it, and it was at last found at the exact point where it must be to produce the otherwise unaccountable motions that had been observed in Uranus. This is regarded as one of the great triumphs of astronomy. Soon afterwards it was discovered that Neptune has one moon, moving about it from east to west. Through the telescope the planet is so faint and far away that little can be learned about it, and it appears only as a faint body of bluish or leaden tint.

Nerbud'da or **Narbada,** a river of India which rises in Gondwana, flows in a general west-southwest direction and empties into the Gulf of Cambay. Its total length is about 750 miles. In religious sanctity this river ranks second only to the Ganges.

Nereids, *ne're idz,* in classical mythology, sea nymphs, daughters of Nereus and Doris and constant attendants on Neptune. According to some accounts they were human in form; according to others, they had the tail of a fish. They were usually represented as riding about on horses.

Ne'reus, in classical mythology, the father of the Nereids, an inferior divinity of the sea and a god subordinate to Neptune. By the ancient artists and poets he was represented as an old man, wreathed in sedge, seated upon the waves.

Ne'ro (37–68), a Roman emperor, the son of Cneius Domitius Ahenobarbus and of Agrippina, the daughter of Germanicus. When Nero was about seventeen years of age his mother poisoned her husband, Claudius, and succeeded in securing the throne for her son, over whom she expected to exercise the most absolute control. In the year after his accession Nero disposed of the rightful heir, Britannicus, by poison. For the first few years his public conduct, under the control of Seneca, was unexceptionable; in private, however, he disgraced himself by the most odious vices, and his mother endeavored to retain her influence by shamefully complying with his inclinations. In 59 Nero caused his mother to be murdered, and then, fearing no rival in power, he gave full scope to the darkest traits of his character. In 64 occurred the burning of Rome, which was charged upon Nero, who, however, accused the Christians of the act and made it an excuse for the most dreadful cruelties toward them. His debaucheries and cruelties occasioned an almost general conspiracy against him, the discovery of which led to more tortures and bloodshed. The revolt of Vindex was also suppressed, but that of Galba succeeded, and Nero escaped arrest by stabbing himself. He was a lover of arts and letters and possessed much taste as a poet.

NERO

Nerva, *nur'va,* (32–98), a Roman emperor, one of the most virtuous of the emperors. He was twice consul and was elected emperor on the death of Domitian, in 96. He adopted Trajan, who succeeded him.

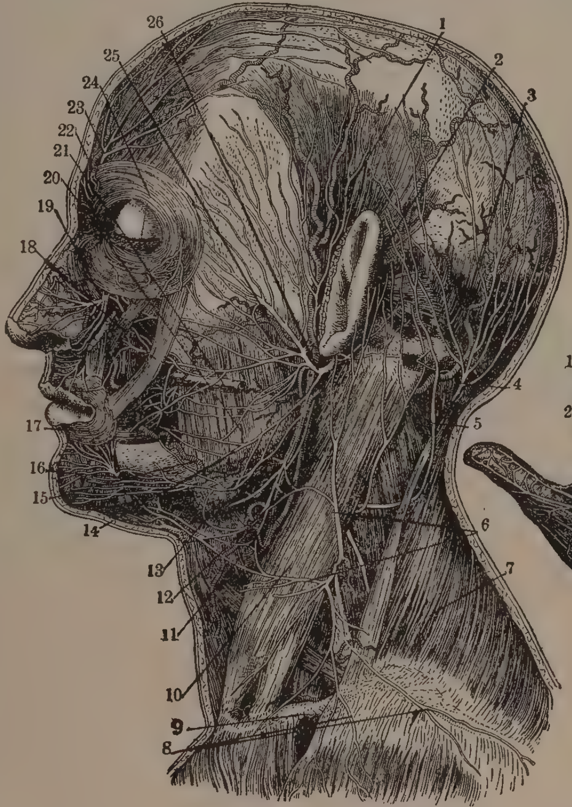
Nerves, *nurvz,* the bundles of sensitive fibers which carry impulses and sensations between the nerve centers and other parts of the body. Each of these nerves consists of several smaller bundles of fibers, each of which is clothed with a protecting tissue, and each complete nerve has also a special sheath of tissue. The whole is somewhat elastic, and its color is a grayish-white. For the distribution and functions of nerves, see NERVOUS SYSTEM; ANATOMY.

Nervous Diseases, diseases due either to actual changes in the structure of nerve fibers or nerve centers, or to some irregularity of nerve function, without actual structural change. Nervous diseases may arise from such causes as inflammation or degeneration of nerve substance; the pressure on some part of the nervous system of tumors, effused blood or other fluid; the death of some part, by the cutting off of its blood supply, or the lowered nervous action which comes as a result of general bad health. See articles on APOPLEXY; EPILEPSY; LOCOMOTOR ATAXIA; NEURALGIA; SAINT VITUS'S DANCE, and other nervous diseases.

Nervous System, that part of animal bodies which includes the nerve centers and their connecting nerves. The human nervous system is divided into cerebro-spinal and sympathetic systems and is more complex and more highly developed than that of any of the lower animals.

CEREBRO-SPINAL SYSTEM. This division of the nervous system includes the brain, the spinal cord and nerves branching off from them. For a description of the brain, see BRAIN.

The *spinal cord* is a mass of nerve matter filling the canal of the spinal column and extending from the medulla oblongata to the first lumbar vertebra. It is about 18 inches long and is divided by deep fissures into right and left halves, each of which consists of anterior, lateral and posterior columns. The outside of the cord is composed of white nerve fibers, and the inside consists of gray matter, forming an irregular mass whose vertical structure somewhat resembles the letter *H*. In the center of the cord is a canal, which connects at its upper extremity with the ventricles of the brain. At the lower extremity the spinal cord divides into a number of nerve trunks, some of which continue downward within the spinal column to the sacrum. In the lower part of the neck there are also enlargements, from which nerves branch off to the arms, and in the lumbar regions are similar enlargements, from which branch the nerves to the lower extremities. Between these points the spinal nerves branch off in pairs upon each side of the cord and pass out of the spinal column through the openings between the vertebrae. In all, there are 31 pairs of these nerves, each pair consisting of two sets of nerve fibers—sensory and motor.



SUPERFICIAL ARTERIES AND NERVES OF THE FACE AND NECK

1, Temporal artery· 2, artery behind the ear; 3, occipital artery; 4, greater occipital nerve; 5, smaller occipital nerve 6, nerve of the neck; 7, trapezius muscle; 8, clavicular nerves, 9, clavicle; 10, sterno-cleido-mastoid muscle, 11, outer artery of the head; 12 inner artery of the head, 13, salivary gland; 14, nerves of the lower jaw; 15, outer maxillary artery; 16, nerve of the chin; 17, circular muscle of the mouth; 18, greater yoke muscle; 19, nerves below the eye; 20, masseter, or chewing muscle; 21, ear passage; 22, arteries of the forehead; 23, nerves of the forehead; 24, eye-closing muscle; 25, facial artery; 26, facial nerve.

NERVES OF THE HAND

1, Nerves of the skin; 2, tendons; 3, arteries of the palm of the hand; 4, elbow nerve; 5, elbow artery; 6, nerve of the forearm; 7, nerve of the under-arm; 8, artery of the under-arm.

The sensory, or *afferent*, nerves originate in the posterior column of the spinal cord, and before joining the motor nerve the fibers form a ganglion (See GANGLION). These are the nerves of feeling, which transmit impressions from without through the spinal cord to the brain centers. The motor, or *efferent,* nerves originate in the anterior column of the spinal cord, but do not form a ganglion before joining the sensory nerve. The sensory and motor nerves meet and constitute a pair as they emerge form the spinal canal and run side by side to their extremities. Wherever one divides, the other makes a similar division, until in their final subdivisions they become so small that the fibers cannot be distinguished. Motor nerves are nerves of motion and convey impulses from the nerve centers outward.

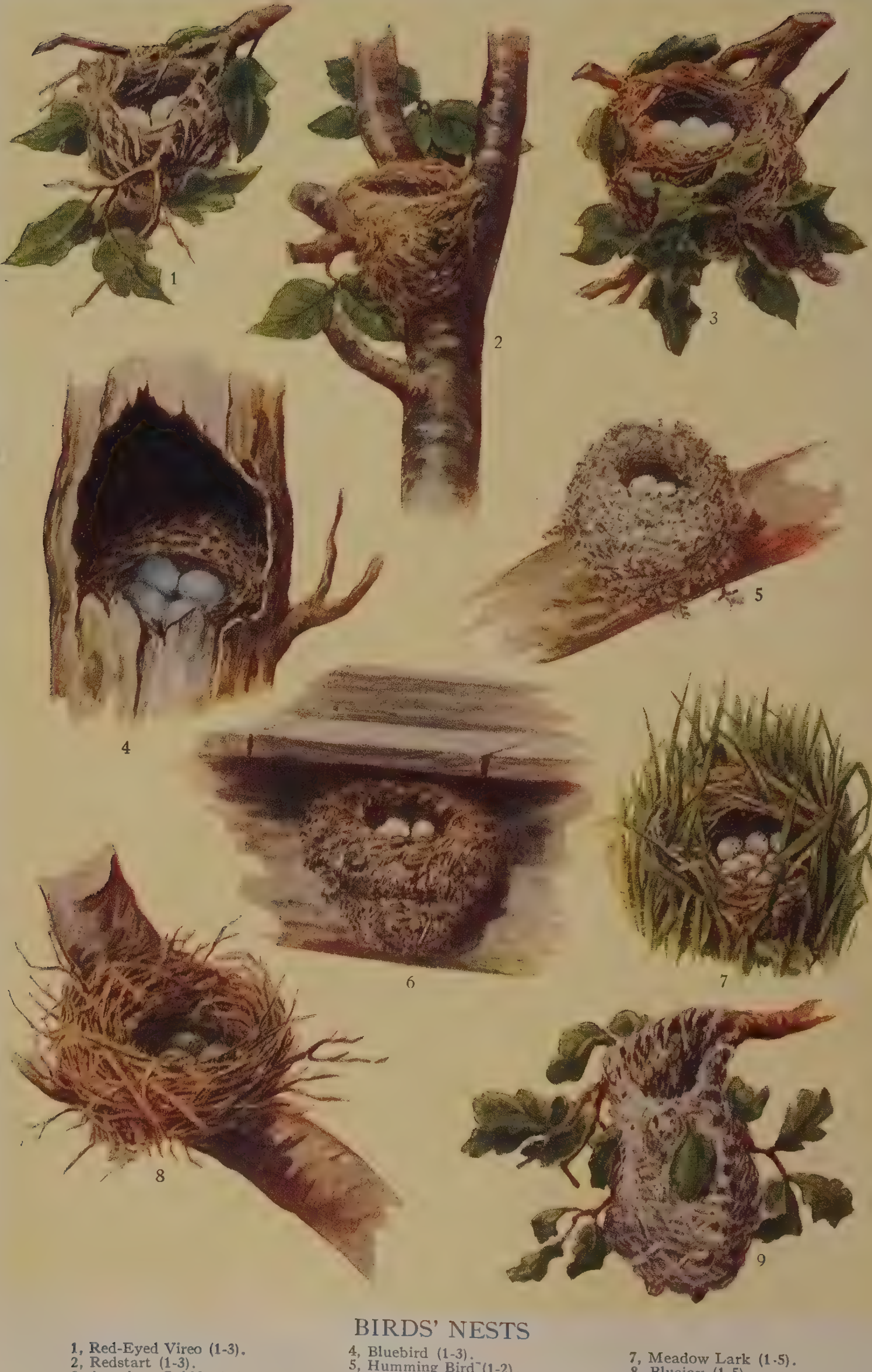
These nerves look like white cords and are called nerve trunks when they branch from the spinal cord. Each one consists of a central axis of gray matter, usually known as the *band axis,* enclosed in a sheet of white, fibrous nerve tissue. The nerves then interweave and form networks, or plexuses, of nerve fibers, and in their last divisions they constitute a complete network in the skin, where the sensory nerves are so numerous that a prick from the finest needle anywhere on the surface of the body injures one or more of them, and the pain arising from the wound makes the person conscious of the injury. See color plate, ANATOMY.

THE SYMPATHETIC SYSTEM. This system consists of a series of ganglia, extending from the head through the neck, thorax and abdomen to the pelvis. In the thoracic and abdominal cavities the ganglia are arranged in pairs on either side of the spinal column and terminate in a single ganglion in the pelvis. The sympathetic nerve centers of the head distribute nerve fibers to the muscles which control the pupil of the eye (See EYE) and to the palate and glands about the mouth. The thoracic ganglia are twelve in number and are all connected by a sympathetic cord. They also communicate with the cerebro-spinal nerves. Nerves from these ganglia pass to the different abdominal organs and control the action of the glands whose functions are concerned with digestion and excretion. The two principal ganglia of the abdominal cavity are the largest in the system, and the branches from these unite to form the *solar plexus,* which is situated directly back of the stomach. This ganglion sends nerves to various abdominal plexuses and also to the blood vessels that follow the intestines and the other abdominal organs. These ganglia are also connected with each other by a sympathetic cord and by spinal nerves with the cerebro-spinal system.

In structure and general appearance the sympathetic nerves resemble those of the cerebro-spinal system. They are less sensitive and slower to act than the cerebro-spinal nerves, and they preside over the vital functions—circulation, digestion, secretion and excretion.

PHYSIOLOGY. The functions of the nervous system are to coördinate the movements of the body and to bring to the centers of intelligence and action communications from the outside world. The nerves of the cerebro-spinal system are arranged in pairs. One nerve of each pair, the sensory, carries impressions from without to the brain, and the other, the motor, carries them from the brain and other nerve centers outward. A nerve can be aroused to action artificially by any of the following means: Mechanical action, such as touching, striking or pinching; a change of temperature, provided it is sudden, as when the hand is brought in contact with a hot or cold object; chemical action, such as that of a strong acid or alkali; electricity. The stimulus arising from any of these agencies is caused by the suddenness of action. A slow rise or fall in temperature will not give rise to a nerve impulse. There are also many stimuli to action from within the body, which are recognized by their outward manifestations, such as the movements arising from the decision to perform a certain act, as throwing a ball or writing a letter. There are other sets of stimuli that act upon special nerves, such as the optic, auditory and olfactory. See SENSES, SPECIAL.

The nature of nerve impulse is not well understood, but it is known to be wavelike in its movements, and it traverses the nerves at the rate of about 100 feet per second. All impulses belong to one of two classes, those that produce feeling and those that produce motion. Both kinds traverse the nerves in both directions. Each kind originates in the class of nerves to which it belongs; motor impulses cannot be excited in, or made to traverse, sensory nerves, nor can sensory impulses be developed in or made to traverse motor nerves. The nature of the impulse is the same, whatever the cause that excites it, and within certain limits its strength is proportional to the strength of the exciting cause. Impulses arising in one set of nerves, as the sensory, are transmitted to the other, as the motor, through nerve centers in which the fibers of these nerves intermingle. If one lays his hand upon the point of a tack, the injury excites an impulse in the sensory nerve. This is carried inward until the fibers



BIRDS' NESTS

1, Red-Eyed Vireo (1-3).
2, Redstart (1-3).
3, American Goldfinch (1-3).
4, Bluebird (1-3).
5, Humming Bird (1-2).
6, Phoebe (1-4).
7, Meadow Lark (1-5).
8, Bluejay (1-5).
9, Baltimore Oriole (1-5).

of the injured nerve mingle with those of the corresponding motor nerve, when the impulse is transmitted outward along the motor nerve and causes the hand to be withdrawn from the object. Movements of this sort are known as reflex. See REFLEX ACTION.

HYGIENE. The nervous system is the most sensitive organism of the body, and consequently it is most easily influenced by unfavorable conditions. The first requisite to its health is a good supply of pure blood. About one-fifth of the blood in the body is required to nourish the brain, and the other organs of the nervous system require a proportionately large amount. If the blood is impure, the brain and nerves are not properly nourished. Pure air, plenty of exercise and nourishing food are essential to pure blood and thus to the health of the nervous system. Another important requisite is a sufficient amount of sleep and rest. See SLEEP.

Many drugs used for the alleviation of pain are beneficial when administered under the direction of a physician, but they are decidedly injurious when taken indiscriminately, and their continuous use soon produces a habit which it is almost impossible to break. Among drugs whose use should be avoided, except when prescribed by a physician for a limited time for the alleviation of pain, are chloral, cocaine, opium, morphine and numerous coal tar preparations, such as antifibrin and antipyrin. These drugs act directly upon the nerve centers, dulling their sensitiveness, preventing proper nutrition of the nervous system and in every way impairing its usefulness.

The habitual use of alcoholic and malt liquors and tobacco has a similar effect. These substances are especially injurious to the young, whose nerves and brain are in a formative condition. Perhaps the greatest danger arising from the use of any drug or narcotic is the tendency to form an unnatural appetite for it, which increases with the habit, until the person becomes overpowered by the craving. For these reasons, as well as many others of which the limits of this article will not admit mention, substances of this sort should be strictly avoided.

Nest, the name given to the homes built by birds, chiefly as safe places in which to hatch their eggs and rear their young. Nearly all birds build nests of some sort, and the marvelous instinct that leads every bird to build its nest exactly as its parents did before it, is one of the strangest things in nature. Birds rarely give any attention to the comfort of themselves in the building of their nests. They prepare a place which will insure the hatching of their eggs and the protection of their young while they are helpless. A few species, however, build no nests at all, but drop their eggs into the nests of other birds and abandon them to the foster parents. For instance, the American cowbird will lay its eggs in the nest of the yellow warbler. Not infrequently the warbler resents the presence of this foreign egg and builds a second nest above the first, abandoning its own eggs in so doing. Examples are known where a nest has been built in this way in three tiers before the warbler was able to remain in undisturbed possession of her own nest. There are other species that lay their eggs upon the bare rocks or in little holes in the sand and sit patiently upon them there. Most of the water fowl and many of the shore birds build their nests upon the ground. In nearly all cases some attempt is made at concealment, and even when the nests are rudest, the bird still remembers to make them harmonious with their surroundings, or to put them in some inconspicuous place. The wild turkey will never leave her nest until she has safely covered the eggs with leaves. Although some of the ground nests are little more than rude platforms of twigs, others are elaborately woven and carefully lined with soft moss or even with down plucked from the breast of the bird herself. In the tropics, some birds collect large piles of vegetable matter, and after it has decayed for some days, they will lay their eggs in holes in this mass, which in rotting furnishes the heat to hatch the young chicks. The kingfishers, sand martins and other birds excavate deep burrows into a bank, usually facing the water, and lay their eggs in rude little nests at the end. These burrows are usually not straight. The kingfisher's gallery may turn abruptly to the right or left. The petrel found in the United States digs a very tortuous gallery of considerable length, so that its nest is frequently directly under the opening. In the southwestern parts of the United States the burrowing owl lives in the homes of the prairie dogs.

The most remarkable nests, however, are those which are built either in trees or in small shrubbery above the surface of the ground. Here the diverse habits of the birds show themselves at once. The robin and some others make a foundation of clay, which they cover with twigs and leaves and line with hair or other soft substances. The clay is molded and carefully plastered in position, but neither the robin nor the swallow, who builds a purely clay nest, will use the structure until it is well dried. Some of the bottle-shaped clay nests of the swallows are curious affairs, with protruding necks bent downward so that the opening of the nest is from below. Woodpeckers dig their way into dead trees or stumps. The ivory-billed woodpeckers are strong enough to excavate a nest in the hardest wood. Many other birds build in holes or crevices in trees and stumps that they have not excavated for themselves. An example of this class is seen in Fig. 4 of the color plate. A familiar example of the best of the nest work is that of the Baltimore oriole, whose slender hanging nest, far out on the tip of some slender twig, is well protected against invasion. Fig. 9 of the color plate shows the oriole's nest, which is always closely woven, but is more elaborate and better constructed by those birds which live around dwellings where they are able to get twine or cotton and wool. The weaver birds make curious, swinging, bottle-shaped structures, which are entered from below, the nest itself being built within, on the side of the bottle. Other species are even more remarkable, for many pairs of birds join in building a huge shedlike structure, in which they place their nests, each separate from the other and all communicating with the outside by a separate passageway. In Mexico a flycatcher builds a remarkable structure, sometimes three or four feet long by two wide, on one side of which is an opening leading into the nest. Other small and timid birds build their nests in crevices on the outside of the flycatchers' home. Some of our birds build exquisite little nests, and nothing is prettier than the delicate work of the ruby-throated hummingbird, as may be seen in Fig. 5 of the color plate. The great variety and wonderful forms of the nests prevent giving any extended description of them all. See TAILOR BIRD; BIRDS' NESTS, EDIBLE.

Nes'tor, a Greek hero, son of Neleus, king of Pylos. He took part in the hunting of the Calydonian boar, in the Argonautic expedition and, although he was at that time very old, in the Trojan War. During that struggle he was the wisest adviser of the Grecian chiefs.

Nesto'rians, a Christian sect of western Asia, named from their founder, Nestorius. They denied the union of the divine and human natures in Christ, holding that he possessed two distinct personalities, the union between which was merely moral. After the Council at Ephesus the Nestorians were driven by imperial edicts into Persia, where they firmly established themselves. The greater number of their churches perished under Timur's persecutions. Most of the survivors were converted to Catholicism and are now known as Chaldeans. The remnant of the sect live in Persia and Turkey and number about 80,000.

Net, an open fabric, made of thread, twine or cord, woven into meshes of fixed dimensions, firmly knotted at the intersections. Nets are used for a great variety of purposes, as for protecting fruit trees, for collecting insects, for hammocks and for screens, but chiefly for hunting and fishing. The chief kinds of nets used in fishing are the trawl, the drift, the seine, the kettle, or weir, and the trammel, or set net. The *trawl* is a triangular bag, with an arrangement for keeping its mouth open, and it is drawn along the bottom of the water. *Drift* and *seine* nets are very long in proportion to their breadth and differ from one another only in the manner in which they are employed. The seine has a line of corks along one of its long borders, and a line of leaden weights along the other, so that when thrown into the water it assumes a perpendicular position. It is used near the shore, being dragged to land with any fish it may enclose, by ropes fastened to the ends. The drift net is not loaded with lead, but floats in the water, and is used especially in herring fishing, the fishes as they drive against it becoming caught by the gills. *Kettle* and *weir* nets are structures fixed on stakes placed along the coast between high and low water. *Trammel* or *set* nets are also fixed between stays, but act like drift nets. See ANGLING.

Net, a term applied to that which remains of a weight or quantity after making certain deductions. Thus, *net weight* is the weight of merchandise after allowance has been made for casks, bags or any enclosing material. *Net profit* is the proceeds of a transaction, after all expenses are paid.

Neth'erlands, THE, or **Holland,** a kingdom of Europe, lying on the western border of the continent, bounded on the w. and n. by the North Sea, on the e. by Prussia and on the s. by Belgium. It lies between 50° 45′ and 53° 32′ north latitude and between 3° 25′ and 7° 12′ east longitude. Its area is 12,648 sq. mi., a little more than that of Maryland, and its population in 1904 was 5,509,659. The country is divided into eleven provinces—North Brabant, Gelderland, South Holland, North Holland, Zeeland, Utrecht, Friesland, Overyssel, Groningen, Drenthe and Limburg.

SURFACE AND DRAINAGE. The country forms, with part of Belgium, the lowest region of Europe. Some portions of the surface of the Netherlands are from sixteen to twenty feet below the level of the sea, and nearly all parts are too low for natural drainage. In great part the coast is so low that, were it not for massive dikes, large areas would be inundated. In the interior, also, dikes are a common feature, being built to protect portions of land from the lakes and rivers or to enable swampy pieces of land to be reclaimed by draining. These enclosed lands are called *polders,* and by the formation of these polders the available land of the country is being constantly increased in area. Lakes and marshes are converted into fertile fields, and considerable areas are even rescued from the sea. One of these reclamations was the lake of Haarlem, the drainage of which was begun in 1840 and finished in 1853. This has yielded about 72 square miles of good land. The project of draining a great part of the Zuyder Zee is under way at present.

Almost the only highlands in the Netherlands are the sand hills, about 100 to 180 feet high, which form a broad, sterile band along the coast of South Holland and North Holland, and a chain of low hills, probably of similar origin, southeast of the Zuyder Zee. The highest elevation, 1050 feet, is in the extreme southeast. The general aspect of the country is flat, tame and uninteresting, and about one-fifth of the whole surface consists of marsh, sand, heath or other unproductive land.

The coast line of the Netherlands is very irregular, the largest indentation being the Zuyder Zee. In the same line with the sand hills, extending past the mouth of the Zuyder Zee, runs a chain of islands, namely Texel, Vlieland, Ter Schelling, Ameland and others, which seem to indicate the original line of the coast before the ocean broke in upon the low lands. The most important rivers of the Netherlands are the Rhine, the Maas, or Meuse, the Scheldt and the Yssel. The Rhine is over one-half mile wide where it enters the country. It soon divides, the south arm, which is the more important division, taking the name of Waal and uniting with the Maas, while the north arm, communicating with the Yssel, takes the name of Lek. The Maas, entering the Dutch Netherlands from Belgium, receives the Roer. Of the Scheldt, little except the mouths is within the boundary of the Netherlands. The navigable canals are collectively of more importance than the rivers. The chief of these are the North Sea Canal, 15 miles long, between the North Sea and Amsterdam, and the North Holland Canal, 46 miles long, between Amsterdam and the Helder. There are numerous smaller canals, all of the towns and many of the villages being connected with one another in this manner. Most of the domestic traffic of the country is over these canals. Lakes are very numerous.

CLIMATE. The climate of the Netherlands is humid, changeable and disagreeable. The range of temperature is not great, as the average temperature for the coldest months is slightly over 35° F., the average temperature for the hottest months slightly over 64° F.

INDUSTRIES. As the land of this coastal plain is composed largely of débris brought down to the sea by the agency of ice or water, minerals are very scarce. Coal is mined in small quantities. Peat is very plentiful, and the cutting of peat is an industry of some importance. Gardening and agriculture have attained a high degree of perfection. Wheat, while of excellent quality, can be grown only in favored portions of the southern provinces; rye, oats, buckwheat, horse beans, beets, madder and chicory are more common crops. Tobacco is cultivated in the provinces of Gelderland, South Holland and Utrecht; flax in North Brabant, the south of North Holland, Friesland and Zeeland; hemp, sugar beets, oil seeds and hops, in various parts of the kingdom. Culinary vegetables are cultivated on a large scale. Large quantities of them are sent to England, and the exportation of the seeds forms an important article in Dutch commerce. The cultivation of flowers has been carried to a point unequaled in any other country of Europe, and flower seeds and bulbs are exported to all parts of the world.

Stock raising is the most important industry of the Netherlands, especially in the coast provinces. Cattle, horses, sheep, swine and goats of excellent breed are reared in great numbers. Dairy products, especially cheeses, are marketed in immense quantities. In the estuaries of the great rivers, in the coast waters and in the open sea, fishing is very extensively carried on. Sprats and oysters are the chief products of the coast fisheries, and herring is the principal product of the deep-sea fisheries. Hundreds of thousands of herring are taken annually.

Manufactures in the Netherlands, while numerous and flourishing, are not one of the most important of the industries. Woolen and cotton cloth, silks and velvets are produced in considerable quantities, and linen of excellent quality is manufactured in the southeast and in North Brabant. Pigments, brandy, gin, paper, glass, earthenware, brick and tiles are among the other leading manufactures. The glazed ware for which Delft has long been famous is still produced there.

TRANSPORTATION AND COMMERCE. The canal system is so general that railroads are of importance chiefly for international, rather than internal, commerce. There were, in 1904, 1817 miles of railway in operation, besides 1090 miles of tramways and 1907 miles of canals.

The Netherlands is one of the important trading countries of the world. The trade is chiefly maritime, and much of it is in the nature of carrying trade. In 1904 the imports were about $980,000,000, the exports about $800,000,000. The foreign commerce is chiefly carried on with Germany, Great Britain, Belgium, the Dutch East Indies and the United States. Rotterdam and Amsterdam are the centers of the foreign trade. The importation and re-exportation of the products from the Dutch colonies throughout the world is one of the chief branches of the commercial activity.

INHABITANTS. The stock to which the people belong is Teutonic, the great majority of the inhabitants being descendants of the old Batavians. These comprise over 70 per cent of the population and are chiefly settled in the provinces of North and South Holland, Zeeland, Utrecht and Gelderland. The Flemings, of North Brabant and Limburg, and the Frisians, of Friesland, Groningen, Drenthe and Overyssel, form the other groups. According to the recent census there are only about 50,000 people of foreign birth living in the Netherlands. The emigration from the country is very small.

EDUCATION. Elementary schools are everywhere established and are partly supported by the State, but education is not compulsory and the proportion of illiterates is large. Higher schools exist in all the chief towns, and there are four universities—at Leyden, Utrecht, Groningen and Amsterdam.

LANGUAGE AND LITERATURE. The language which is spoken in the kingdom, as well as in the East and West Indian colonies of the Netherlands and by the Boers in South Africa, is called Dutch. This word, which comes from *Dietsch*, means vernacular language and was originally applied to distinguish the popular speech from the Latin. In its present form, as well as in its earlier stages, the Dutch is well-nigh identical with Flemish, the language of the Low German inhabitants of Belgium. In its structure, Dutch is closely allied to German, but it is written in the Roman alphabet, and capitals are used almost exactly as in English.

The earliest Dutch literature consists of versions of the Arthurian legends, the song of Roland and other French romances, and some of these date from early in the thirteenth century. A version of *Reynard the Fox*, produced about 1250, is the first noteworthy example of literature in the Dutch language. The Old Testament had been translated and the *Life of Jesus* produced before the Reformation, which affected Dutch literature strongly, as it did that of other countries. The contest with Spain late in the sixteenth century gave rise to many battle songs and hymns in praise of liberty. By the beginning of the eighteenth century, poetry and the drama, which had flourished during the previous century, had become so greatly affected by French literature as to retain little of their distinctively national character. During the nineteenth century perhaps the most noteworthy men in Dutch literature were Lennep, Dekker and Maartens, novelists; Hasebroek, an essayist; the poets Genestet, Da Costa and Ten Kate, and the critic Ten Brink.

ART. See PAINTING; SCULPTURE.

COLONIES. In addition to her European territories, the Netherlands possesses extensive colonies and dependencies in the Asiatic Archipelago and in America. These possessions include the Dutch East Indies, Dutch Guiana, or Surinam (See DUTCH GUIANA), and the West Indian islands of Curaçao, Buen Ayre, Eustatius, Saba, Aruba and half of Saint Martin. The total area of the Dutch colonial possessions is about 783,000 square miles, and the total population about 36,000,000.

GOVERNMENT AND RELIGION. The government of the Netherlands is an hereditary constitutional monarchy, the executive power being vested in a king or queen, and the legislative in the parliament, or States-General, of two chambers. The upper chamber consists of 50 members, elected by the provincial councils, or assemblies of the eleven provinces; the lower chamber consists of 100 members, chosen by direct suffrage, which is limited by a considerable property qualification. The term of members of the upper house is nine years, that of members of the lower house, four years.

Complete religious freedom exists in the Netherlands. The Protestants, who constitute about three-fifths of the population, belong for the most part to the Dutch Reformed Church. Second in size is the Roman Catholic Church. The Jansenists number about 9000, and the Jews over 100,000.

Cities. The chief cities of the Netherlands are The Hague, the capital; Amsterdam, Rotterdam, Utrecht, Groningen, Haarlem, Arnhem and Leyden. These are all described under their titles.

History. The Netherlands comprised originally the territory embraced by the present kingdoms of the Netherlands and Belgium. The Romans, who subjugated the native tribes in the first century of the Christian era, ruled the country until about the beginning of the fifth century, when the Franks crossed the Rhine and conquered the southern part. Although for a time the Frisians in the northern part of the country preserved their independence, about the eighth century the whole territory was incorporated in the Frankish Empire, and the people were converted to Christianity. When Charlemagne's empire was divided after the death of his son, Louis the Pious, the region of the Netherlands was divided into three parts, the northern part falling to Germany, the central to Lotharingia and the southern to France. Gradually the northern province became distinctly German in language and customs, and the southern part became French, while the central province combined the characteristics of the two others. In the latter part of the Middle Ages the cities of the Netherlands, especially Bruges, Ghent and Antwerp, rose to great prosperity and became of immense importance through their commerce and manufactures. In the fourteenth century the entire territory passed under the rule of the dukes of Burgundy, and through the marriage of Mary of Burgundy, the daughter of the last duke, with Maximilian of Austria, the Low Countries became a possession of the House of Hapsburg. Under the grandson of Maximilian, Charles V, the Netherlands were first formally united with the Spanish crown.

This union was disastrous for both countries, because the greater part of the inhabitants of the Netherlands were strongly Protestant, while Spain was the most radically Catholic country of Europe. Charles V, who had been born in the Netherlands and loved the Dutch people, did little toward enforcing the Catholic religion, but his son, Philip II, oppressed the Dutch beyond the limits of endurance. Finally, under the leadership of William of Orange and the counts Egmont and Hoorne, the people rose in rebellion. The duke of Alva was sent with a Spanish army to the country and was instructed to deal with it as conquered territory. Persecution began at once, and several of the most prominent and patriotic citizens, among them the counts Egmont and Hoorne, were put to death. In 1568 William of Orange, who had escaped death by withdrawing from the country, returned and undertook its liberation. During the war which followed, many prosperous Dutch towns endured sieges and were sacked when captured. The hatred for Alva increased, and as Philip II was not satisfied with the effects of his rule, he recalled him and sent in his place Requesens. In 1576 the southern provinces entered into an alliance with the northern provinces, which was known as the Pacification of Ghent; but Alexander Farnese, who became viceroy of the Low Countries in 1578, was able by diplomatic measures to separate the southern provinces from the northern and to induce the former to return to their allegiance to Spain. The northern provinces, however, by the Union of Utrecht, in 1579, declared their independence of Spain. William of Orange now became the ruler of Holland and Zeeland, and the duke of Anjou, the brother of Henry III of France, assumed control of the other provinces. In 1584 William of Orange was assassinated (See William, Prince of Orange, Count of Nassau). From this time on, Philip was too much occupied with affairs in France and England to give much attention to the Netherlands, but Austria carried on the struggle against the United Provinces, and although the Dutch were everywhere successful on the sea, the country was desolated by the wars and a twelve years' truce was concluded in 1609.

The independence of the Netherlands was now recognized by all the powers except Spain, but it was not fully assured until the Peace of Westphalia, at the close of the Thirty Years' War. In the seventeenth century the Netherlands became one of the foremost commercial and maritime powers in the world, and for a long time maintained dominion on the sea. The southern provinces were ruled first by Spain and then by Austria, and in 1797 they came under the power of the French Republic. In 1806 Napoleon made the Netherlands into a kingdom for his brother Louis Bonaparte, and in 1810 this kingdom was united with France. The Congress of Vienna in 1815 joined Belgium and the Netherlands in a single kingdom with William I, the son of the last stadtholder, as king. This arrangement was very unsatisfactory, as the inhabitants of Belgium were almost all Catholics and the inhabitants of the Netherlands were with few exceptions Protestants. In 1830 Belgium declared itself independent, and although the king of the Netherlands made determined efforts to put down the revolt, the European powers at length intervened and guaranteed the independence of Belgium (See Belgium, subhead *History*). The people of Holland under William II and William III obtained increased freedom and prosperity. Upon the death of William III, in 1890, Wilhelmina became queen, under the regency of her mother. In 1898 The Hague was chosen as the meeting place of the International Peace Congress, and following this came the establishment at The Hague of a permanent International Tribunal for the arbitration of disputes between nations. See Peace Conference, International.

Consult E. de Amicis's *Holland and Its People*; William Elliot Griffis's *The American in Holland*; John Lothrop Motley's *Rise of the Dutch Republic*.

Neth′ersole, Olga (1870–), an English actress, born in London. She made her début in London in 1888, attaining her first success in *The Profligate*. Two years later she toured Australia and in 1894 came to America, where, in *Camille*, *Carmen*, *Sapho* and other rôles, she won great popularity. She made several later tours of America, though she scarcely attained her former success.

Net′tle, the name given to a large family of plants. The species are usually covered with extremely fine, sharp hairs, filled with a bitter fluid, which causes inflammation and pain when injected into the skin. Nettles yield a tough fiber, which may be used as a substitute for hemp. In Dresden a thread is produced from nettles, which is so fine that sixty miles weigh only two and one-half pounds. One kind of nettle is used in China to make the China grasscloth, and various other species are used for textile purposes. Species of nettles are common in the United States. The so-called *dead nettle* is not a nettle at all.

Nettle Tree, a name applied to several trees which belong to the nettle family but lack the stinging qualities. The common or European nettle tree grows to the height of thirty or forty feet and is frequently planted for ornament in the south of France and north of Italy. The wood is useful for various purposes. One species, sometimes called the sugar berry, is a much larger tree, often attaining a height of from sixty to eighty feet. It is a native of North America from Canada to Carolina. Another variety, the American nettle, is often called hackberry.

Neuchâtel, *nö sha tel′*, a town of Switzerland, the capital of the canton of the same name, on Lake Neuchâtel, 25 mi. w. of Bern. It has some beautiful streets and interesting buildings, among which the most noteworthy is the twelfth century abbey church. The city possesses a library of 100,000 volumes, a museum of fine arts, a museum of natural history, an observatory and a number of schools. Watches and jewelry are manufactured, and the trade of the town is considerable. Population in 1900, 126,279.

Neuchâtel, Lake of, a lake of Switzerland, in the western part of the country, 18 mi. n. of the Lake of Geneva. It is the third largest lake of Switzerland and is 24 miles long and from 2 to 5 miles wide. Its shores, which are in part low and marshy, have comparatively little of the picturesque beauty of the other lakes of Switzerland.

Neumecklenburg, *noi mek′len boorK* (formerly New Ireland), the second largest island of the Bismarck Archipelago, in the Pacific Ocean, 350 mi. n. e. of New Guinea. Its area is about 4900 square miles. The islands are volcanic, but the soil, at least on the coast, is very fertile. As the climate is unhealthful, the island has never been permanently colonized by Europeans.

Neuralgia, *nu ral′je ah*, the name applied to a condition of the nerves that gives rise to severe pains in the course of one or more distinct nerves only, being, by this localization, distinguished from other pains. In neuralgia of the fifth nerve, the pain is in one-half of the face, and if the central branch is affected, the pain is confined to the upper jaw. Neuralgia of the intercostal muscles manifests itself in a circle of pain around the breast. Among the numerous causes of neuralgia are injuries to the nerve, inflammation of the nerve itself, irritation of the nerve produced by ulcers or swellings in the adjacent parts, especially in the cavities of the teeth. Thin-blooded persons and those of weak nerves are most liable to be affected by neuralgia, which varies much in degree and duration. The pain is usually greatest at night, though it may reappear suddenly at intervals during the day. Heat and cold seem to increase it. Neuralgia often becomes chronic, and not infrequently it appears suddenly in such diseases as typhus or intermittent fevers.

Neuras′theni′a (nerve weakness), a disease of the general nervous system, very common in the United States and, in fact, in all parts of the world. It comes as a result of continuous strain or excess of any sort. Overwork produces a large proportion of the cases, but excessive use of tobacco and stimulants or vicious habits of any sort are prolific causes. It affects the sexes about equally and is usually chronic, because the causes which produced it have been long standing and the restoration of power in the nerves themselves is always a slow and difficult process. The symptoms of neurasthenia are multitudinous; the functions of almost every organ may be affected by it and may show their weakness by the symptoms which are characteristic of diseases of that organ. Nervousness, irritability, loss of sleep and impaired digestive functions are always present to a greater or less degree. When there are no organic diseases connected with it, neurasthenia may be cured, especially in its earlier stages, if the causes are removed and proper attention is given to diet and rest. Rest and freedom from care and worry, in connection with active out-door life, are the best remedies.

Neuri′tis, inflammation of a nerve. Tenderness in the course of the nerve and pain recurring in paroxysms are among the symptoms. Paralysis may occur as a result, and in the case of a special nerve of sense, loss of the particular sense. Neuritis of the optic nerve, for instance, is a frequent cause of blindness.

Neurop′tera, the name given to a great family of insects, because the supporting ribs of their wings are large and conspicuous, giving them a network-like appearance. The mouth is adapted to chewing, the head is large and distinct from the thorax and the antennae are generally slender. The Neuroptera have no stings. The springtails, May flies, dragon flies, ant-lions, scorpion flies and caddis flies are examples. The last three groups, however, are now set farther along in the classification, because the basis of classification is no longer exclusively in the wings, but is dependent upon the extent and character of the metamorphosis through which the insects pass. See ANT-LION; DRAGON FLY.

Neuro′sis, a name common to diseases of the nervous system which are not accompanied by any discoverable alteration in structure; that is to say, *functional* diseases of the nervous system. Hysteria, for example, is a neurosis; catalepsy, some such form of mental disease as melancholia, various forms of neuralgia and spasm, are also called neuroses.

Neurot′ic, a term introduced into medicine to indicate some relationship to the nervous system. Thus, a neurotic disease is a nervous disease. Such medicines as opium and strychnine are called neurotics, because they affect the nervous system. The word *neurotic* is now applied very generally to the person who suffers from nervous weakness or a nervous disease.

Neutral′ity (Latin, *neuter*, neither), in the law of nations, that state of a nation in which it does not take part directly or indirectly in war between other nations. To maintain itself in this state a nation is often obliged to assume a threatening position, to be able to repel, in case of necessity, every aggression on the part of either of the belligerents. Such neutrality is termed an *armed neutrality*. In maritime wars, the treatment of effects of the enemy on board neutral vessels or of neutral effects on board hostile vessels, gives rise to very important questions. In former times, the principle was generally admitted that the ownership of goods on board of the vessels was the only point to be considered. The belligerents, therefore, seized merchandise belonging to the enemy on board of neutral vessels; but they restored neutral property seized under the enemy's flag. The plenipotentiaries of Great Britain, Austria, France, Prussia, Russia, Sardinia and Turkey, assembled at Paris in April, 1856, agreed that thereafter the neutral flag should protect an enemy's goods, with the exception of contraband of war, and that neutral goods, with the exception of contraband of war, are not liable to capture under the enemy's flag. In the arbitration (in 1872) at Geneva of the *Alabama* claims of the United States against Great Britain, three rules were agreed to by the parties, namely, that a neutral government is bound to use due diligence to prevent the fitting out in, or departure from, its ports, of a vessel which is intended to carry on war with a power with which the neutral power is at peace; that it is bound not to permit a belligerent to make use of its ports as a basis of naval operations or as a source of recruitment of men or military supplies; that it is bound to exercise due diligence in its own ports or waters, and that, as to all persons within its jurisdiction, it must prevent any violation of these duties and obligations.

Neuville, *nö veel′,* Alphonse de (1836–1885), a French painter and illustrator. After studying law for three years, during which time he did much sketching, he determined to devote his life to art. Having served as an officer in the Franco-Prussian War, he was furnished with material for his war pictures. He was not successful in his use of color, but he had the power of drawing very vivid scenes and making his figures natural and lifelike.

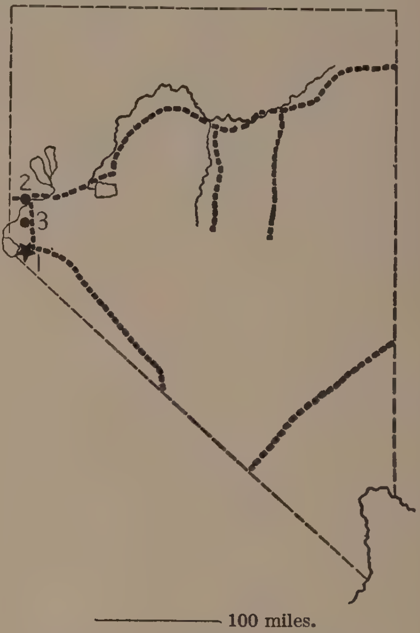
Ne′va, a river of Russia which issues from Lake Ladoga and after a course of 40 miles discharges by several arms into the Gulf of Finland. Its commercial importance is great and is increased by a system of canals, which connect it with the Caspian and White seas.

Nevada, *ne vah′da,* the Sagebrush State, one of the Pacific states, bounded on the n. by Oregon and Idaho, on the e. by Utah and Arizona and on the s. w. and w. by California. Its greatest length from north to south is 483 mi., and its greatest breadth from east to west, 320 mi. The area is 110,700 sq. mi., of which about 1000 sq. mi. are water. Population in 1900, 43,335.

Surface and Drainage. The most of the state is in the area included within the great basin and is the bed of an ancient sea, whose shore lines can be distinctly traced in a number of places. This basin lies between the Sierra Nevada Mountains, on the west, and the Wasatch, on the east. The average altitude of the plateau is about 4000 feet, and upon it mountains rise to altitudes varying from 1000 to over 8000 feet. The highest point in the state is Wheeler Peak, at about the center of the eastern boundary, whose altitude is 13,058 feet. Distributed over the plateau and running principally in north and south directions, are numerous minor or smaller mountain ranges, whose altitudes vary from 6000 to 8000 feet. In some sections there are also ranges extending approximately east and west. Many of the ranges contain numerous passes, and others have been worn away so that only isolated peaks now remain.

The state has but few rivers, and these are small. In the northern section the Owyhee flows into Snake River and thence to the Columbia. The Humboldt, rising in the northeastern part of the state and flowing in a southwesterly direction for about 375 miles into Humboldt Lake, is the largest river in the state. In the southeastern section a few small streams drain into the Colorado, which forms a part of the southeastern boundary. With these exceptions, the streams of Nevada find no outlet to the ocean. Most of them are mountain torrents, which disappear on reaching the lower levels, either in mountain lakes or in swamps known as *sinks*.

There are a number of lakes in the state. Of these Pyramid is the largest, with a length of 35 miles and a width of 10 miles. Lake Tahoe, on the California boundary, 6225 feet above the sea, is, because of its altitude, its great depth, the clearness of its waters and the remarkable beauty of its surroundings, one of the foremost of American mountain lakes and is visited by a large number of tourists each year.



NEVADA
1, Carson City; 2, Reno; 3, Virginia City.
Dotted lines indicate chief railroads.

Climate. The climate is dry, mild and healthful. Severe winds are seldom met; the average temperature for January is about 28°, and for July, about 71°. The thermometer occasionally falls as low as 30° below zero and sometimes rises to 110° above, but these extremes seldom occur. The state is the most arid in the Union, the average rainfall being less than 12 inches, and this is very unevenly distributed as to time and locality. Most of the rain occurs between December and May, and the northern counties receive nearly double the amount received in other portions of the state, while in many valleys and in the southern part of the state rain seldom, if ever, falls.

MINERAL RESOURCES. Nevada is preëminently a mining state, and its development was due to the rich deposits of gold and silver found in the mountains years ago. It was here that the celebrated Comstock lode, which at one time produced over $38,000,000 worth of bullion in a year, was discovered (See COMSTOCK LODE). Numerous other rich mines have also been located within the state, but when the most valuable deposits in these mines had been exhausted, the mining industry declined for a number of years. More recently, however, new mines have been opened in Tonopah and Goldfield, and there has been a second revival of the mining industry. The annual output of gold is now over $3,100,000, and of silver, about $2,100,000. Lead, copper, quicksilver and nickel are also found in paying quantities. Besides the metals, there are extensive deposits of such minerals as borax, soda, silver, potash and rock salt, while marble, granite, alabaster, slate and other valuable building stones are found in large quantities. Some lignite coal has been mined along the Elko River.

AGRICULTURE. The lack of rainfall and the distance from markets prevent agriculture from being largely developed in Nevada. The soil is generally fertile, and, wherever irrigated, it produces abundant crops of hay, cereals and hardier fruits, such as apples, pears and cherries. Along the valley of the Humboldt River and in the west central portions of the state, there are quite large tracts of irrigated land, and numerous farms are found in these regions. In other sections, where there is an abundance of prairie grass, stock raising has become an industry of some importance. The mild climate enables stock to roam without shelter during the winter, and quite large numbers of cattle and sheep are raised.

MANUFACTURING. The manufactures are few. The most important are connected directly or indirectly with mining, being the smelting and refining of ores and the making and repairing of such machinery and tools as are needed for mining purposes. There are a few local industries, such as flour and grist mills and car repair shops.

TRANSPORTATION. Nevada has but few lines of railway. The Southern Pacific crosses the northern portion of the state, following for most of its route the valley of the Humboldt River. This line has constructed a branch northward from Reno, near Albuera, near the northern boundary, and another southward to Walker Lake. The San Pedro, Los Angeles & Salt Lake road also crosses the southeastern part of the state, but the greater portion of the region is without railway communication.

GOVERNMENT. The legislature is composed of two branches, and the membership of both cannot exceed 75. The senate cannot have less than one-third nor more than one-half as many members as the house of representatives. Members for each branch are elected for two years. The legislature meets biennially, and the session is limited to sixty days. The executive department consists of the governor, the lieutenant governor, the secretary of state, the treasurer, the comptroller, the surveyor-general and the attorney-general, each elected for four years. The courts include one supreme court and a number of state district courts, below which are the justice courts and certain special courts of cities and towns.

EDUCATION. Considering its sparse population, the state maintains a good system of schools at a large expenditure per capita. There are high schools in all of the important towns and a state university and agricultural experiment station, located at Reno, and all rural communities are provided with about seven months of school per year.

INSTITUTIONS. The state maintains a hospital for the insane at Reno, an orphans' home at Carson and a state prison at Carson.

CITIES. The chief cities are Carson City, the capital; Reno, and Virginia City, each of which is described under its title.

HISTORY. Nevada was first visited by Spanish friars about 1775. After 1825 trappers entered the region, and Fremont crossed it on his way to California in 1843. It was a part of the territory ceded to the United States by Mexico, by the Treaty of Guadalupe Hidalgo, Feb. 2, 1848, and it was constituted a territory in 1861, with somewhat smaller boundaries than at present. Its area was gradually increased until 1866. Nevada was admitted into the Union as a state in 1864. Although the Mormons had established a camp in the region in 1848, its real history begins with the discovery of silver there in 1859. Owing to the decline of gold and silver mining during the last ten years, the other industries, as well as the population of the state, have decreased. Consult Bancroft's *Nevada and Her Resources.*

Nevada, Mo., the county-seat of Vernon co., 100 mi. s. of Kansas City, on the Missouri, Kansas & Texas and the Missouri Pacific railroads. The city is in an agricultural and stock-raising district, near zinc mines, and it has a considerable trade. It contains large zinc smelters, furniture and iron works and flour and planing mills. A state asylum for the insane is located here, and the city has the Cottey College for women, Saint Francis Academy and an orphanage. There is also an attractive park. The place was settled about 1830, was made the county-seat in 1858 and was chartered as a city in 1880. Population in 1900, 7461.

Nevada State University, a state university, established at Reno and opened in 1886. It is at the head of the educational system and is the only school in the state of collegiate grade. It maintains courses in classics, literature, science, agriculture, civil, mechanical and mining engineering and domestic science. There are also commercial, normal and preparatory departments. In connection with the university there is a school of mines at Virginia City. More than half of the students are women. The faculty contains about 25 members, and there are about 400 students. The annual income from all sources is about $60,000.

Nevers, *ne vair′*, a town of France, capital of the Department of Nièvre, on the right bank of the Loire at its confluence with the Nièvre, 140 mi. s. e. of Paris. It is built irregularly on the slope of a hill, and the older portion has narrow, crooked, unattractive streets. The new town, however, has wide, well-kept streets, and both portions contain some interesting buildings, among which are the Church of Saint Etienne, of the eleventh century; the Cathedral of Saint Cyr, built in the thirteenth century and recently restored; the Palais de Justice, and the lyceum. There are important industrial establishments, including pottery and porcelain works, which produce famous ware. Population in 1900, 27,673.

Nev′in, Ethelbert (1862–1901), an American composer, born at Edgeworth, Pa. He studied under the best instructors in America and Germany and, returning to his native country in 1887, devoted himself to composition. In 1900 he became an instructor in the Yale department of music. His most popular compositions are *Water Sketches*, for the piano, and the song, *The Rosary*. All his work is characterized by delicacy, originality and wealth of melody.

New Albany, *awl′ba ny*, Ind., the county-seat of Floyd co., on the Ohio River, opposite Louisville, Ky., and on the Southern, the Baltimore & Ohio Southwestern, the Chicago, Indianapolis & Louisville and other railroads. Depauw College for women is located here, and the city has several academies, a public library, a fine city hall, a postoffice, a customhouse, large fair grounds and a national cemetery. It is two miles below the falls in the river and has good water power. The industrial establishments include glass works, packing houses, tanneries, engine and boiler works, furniture factories, woolen and flour mills, foundries and other factories. The place was laid out in 1813 and was made a city in 1839. Population in 1900, 20,628.

Newark, *nu′urk*, N. J., the county-seat of Essex co., on the Passaic River, about 3 mi. from its entrance into Newark Bay, and on the Pennsylvania, the Lehigh Valley, the Lackawanna, the Erie and the Central of New Jersey railroads. It is 8 miles west of New York City. Newark, which is the largest city of New Jersey, has an area of 22 sq. mi. and a water frontage of 10½ miles on Newark Bay and the Passaic River. The city is well built on a generally level plain, which slopes upward toward the west, the rise in ground affording a site for the most beautiful residence district. The park system is extensive and includes the beautiful thoroughfare of Broad Street, which is bordered by elm trees. Among the principal buildings of the city are the public library, the Peddie Memorial church, the government building and the Prudential Life Insurance building. The educational institutions include the Newark Academy, the Newark Seminary, Saint Benedict's College, the Newark Technical School, Saint Elizabeth's Academy and a system of public schools. Charitable and benevolent institutions are numerous and include nine public hospitals, among which is the Essex County Hospital for the insane; four orphan asylums, and a number of public homes. The city is well lighted, and the transportation, consisting of steam and electric cars, is very efficient. There are in Newark over three thousand manufacturing plants, which employ some 50,000 persons. Among the products of importance are jewelry, leather, celluloid, hats, shoes, harness, cut and stained glass windows, cutlery, clothing, rubber, beer and ale. The total annual value of the manufactured products is estimated at over $100,000,000.

Near Newark are located the suburbs of Elizabeth, Montclair and the Oranges, which are the residence places of many of the business men of Newark. The city was settled in 1666 by a colony from Connecticut. Its first name was Milford, which was soon changed, however, to the present name. It was chartered as a town in 1712. During the Revolutionary War it took an active part, serving first as headquarters for Washington and later for the British. In 1836 Newark was incorporated as a city. Population in 1905, 283,289.

Newark, Ohio, the county-seat of Licking co., 33 mi. e. of Columbus, on the Licking River and the Ohio Canal and on the Pennsylvania, the Baltimore & Ohio and several electric railroads. The city is in an agricultural region, which contains, also, deposits of natural gas, coal and sandstone, and it has manufactures of electric cars, glassware, locomotives, stoves, flour, implements, chemicals and other articles. It has an attractive location, surrounded by hills, and contains a public library, fifteen churches, six banks and many well-paved streets. The Auditorium is a fine theater building, erected as a memorial to the soldiers of the Civil War. Near the city are extensive remains of the Mound Builders. Newark was settled in 1801. Population in 1900, 18,157.

New Bed′ford, Mass., one of the county-seats of Bristol co., 56 mi. s. of Boston, at the mouth of the Acushnet River, on New Brunswick harbor, which is an arm of Buzzard's Bay, and on the New York, New Haven & Hartford railroad. There are also electric railways to Fall River, Brockton and other places, besides steamboat lines to New York City and other ports. A lighthouse stands on Palmer Island, at the entrance to the harbor, and Fort Rodman is on Clark Point. A large bridge spans the harbor to Fair Haven. The city covers an area of about twenty square miles, and the streets are mostly macadamized and well cared for. The educational institutions include the Textile School, the Friends' Academy, Swain Free School and a large library, opened in 1853. The Saint Luke's and the Emergency are the leading private hospitals. Other prominent buildings are the city hall, the county courthouse, the state armory, the Federal building, the Merchants' National Bank, the Odd Fellows' and Masonic buildings and a number of business blocks.

For almost a hundred years New Bedford was the greatest whaling port in the world, but since the middle of the nineteenth century that industry has declined, and manufacturing has been developed. The city now ranks first in the production of fine cotton goods and fine cotton yarns. Other important products are drills and tools, boots and shoes, fine oils, glass, paints and other goods. There is also a large trade in coal, cotton, lumber, fish and merchandise. The government is vested chiefly in a mayor and a council of two chambers. The place was settled in 1652, was incorporated as a town in 1787 and was chartered as a city in 1847. During the Revolution many privateers were sent out, and the town became a storehouse for captured prizes. September 5, 1778, it was attacked by the British, captured and almost all destroyed. The first ship built in New Bedford was one of those from which the tea was thrown into Boston harbor. Population in 1905, 74,362.

Newbern, *nū′burn,* N. C., the county-seat of Craven co., 107 mi. s. e. of Raleigh, on the Neuse River and on the Atlantic Coast Line and the Atlantic & North Carolina railroads. It has steamship connection with the other coast cities, contains hosiery, knitting, cottonseed oil and lumber mills, and fertilizer, cigar and other factories; it also exports fish and vegetables. The most important structures are the Federal building and the county courthouse. It was settled in 1710 by the Swiss, was for many years an important seaport and was, for a time, the capital of the Province of North Carolina. During the Civil War it was strongly fortified, but it was captured by General Burnside in March, 1862. Population in 1900, 9090.

New Brighton, *brī′ton,* Pa., a borough in Beaver co., 29 mi. n. w. of Pittsburg, on the Beaver River and on the Pennsylvania railroad. It has a public art gallery, a hospital, a Y. M. C. A. building, a high school library and a public park. There are deposits of coal and clay in the vicinity. The river furnishes good water power, and the manufactures include pottery, brick, glass, flour, nails, wire and other articles. The place was settled in 1818 and was made a borough in 1838. Population in 1900, 6820.

New Brit′ain, Conn., a city in Hartford co., 10 mi. s. w. of Hartford, on the New York, New Haven & Hartford railroad. It has very extensive manufactures of hardware, cutlery, tools, foundry and machine-shop products, knit goods, saddlery and other articles. A state normal school is located here, and the city contains a Roman Catholic cathedral and the New Britain Institute. The place was settled in 1687 and was chartered as a city in 1871. New Britain was the birthplace of Elihu Burritt. Population in 1900, 25,998.

New Brunswick, *brunz'wik,* a province of the Dominion of Canada, is bounded on the n. by Quebec and Chaleur Bay; on the e. by the Gulf of Saint Lawrence and Northumberland Strait, which separates it from Prince Edward Island; on the s. by Nova Scotia and the Bay of Fundy, and on the w. by Maine and Quebec. A part of the western boundary is formed by the Saint John and Saint Croix rivers. The greatest extent from north to south is about 215 mi., and from east to west, a little less. The area is 27,911 sq. mi., or a little more than the combined areas of West Virginia and Rhode Island. The province has about 500 mi. of coast line, which contains a number of good harbors.

SURFACE AND DRAINAGE. The eastern part of the province, bordering on the Gulf of Saint Lawrence, is low, and the coast is marshy; but the southern coast, bordering on the Bay of Fundy, is high and contains numerous bluffs. There is a height of land which extends across the province from the northeastern to the southwestern corner and forms the watershed separating the rivers that flow directly into the Gulf and the Bay of Fundy from those that flow northward. This is a comparatively low ridge and nowhere attains an altitude of more than 1500 feet, but there are a few separate peaks which rise from 2000 to 2500 feet above the sea. In general, the surface of the province is that of an undulating plain or low plateau.

The Saint John is the principal river and drains nearly all the western half of the province. It enters the Bay of Fundy by a broad estuary, which is nearly 50 miles long. The most important streams flowing into the Gulf of Saint Lawrence or its coast waters are the Restigouche and the Little Miramichi. The Petitcodiac drains the southeastern part of the province and flows into Shepody Bay, the most northerly projection of the Bay of Fundy. Nearly all of these streams have broad estuaries, which render them navigable for some miles.

CLIMATE. New Brunswick is subject to severe winters and hot summers, although along the coast the changes are not as extreme as in the interior. During the winter the thermometer occasionally falls as low as 30° below zero, and in the hottest summer months it sometimes rises as high as 95°. The coast regions are subject to fogs during portions of the year, but on the whole the climate is healthful, and the extremes of heat and cold are not felt, especially in the interior, because of the dryness of the atmosphere. The annual rainfall is a little over 40 inches.

MINERAL RESOURCES. Some coal of an inferior quality is found, but it is not mined to a great extent. There are also deposits of nickel, antimony, manganese and iron ore among the metals, while graphite, gypsum, limestone and a variety of stone suitable for whetstones and grindstones are found in paying quantities.

AGRICULTURE. The soil of the lowlands and along the streams is highly fertile, and the climate is well suited to the growing of all crops which can be raised in a cool temperate climate; consequently these regions are all occupied by farms; but in the uplands and hilly portions of the province the soil is less fertile and yields but scanty return to the husbandman. Originally nearly the entire province was covered with forests, which included both hard and soft woods. Among the soft woods, spruce, tamarack and fir predominate, and only a limited portion of the forests has been removed, hence much of the land is still untilled. The chief crops are hay and forage plants, buckwheat, wheat, oats and potatoes. Turnips and other root crops are also grown, and in some sections dairying and the raising of live stock are important branches of agricultural industry. Small fruits are raised in large quantities and marketed in New England cities.

OTHER INDUSTRIES. The fisheries are valuable and furnish occupation for a large number of the inhabitants. On both the Gulf and Bay of Fundy coasts, large numbers of cod, herring, smelt and other salt water food fish are taken, while the lobster fisheries are second to none on the Atlantic coast. Salmon also abound in the streams and lakes and are taken in large numbers. The annual value of the fisheries is about $4,000,000.

Among the manufacturing industries, the production of lumber and of lumber and timber products is the most important. The supply of spruce also leads to the manufacture of large quantities of wood pulp. In some localities the manufacture of butter and cheese is also an important industry.

TRANSPORTATION. Each coast has a number of good harbors, and steamer connection is made between shipping ports and Portland, Boston and other important cities on the Atlantic coast of the United States. The Inter-Colonial and

Canadian Pacific railways also traverse the province, the former the eastern portion and the latter the western portion. Each of these lines has branches extending to important manufacturing and trade centers; a cross line from Fredericton to New Castle connects the two systems, so that the province is fairly well supplied with railway facilities, the entire mileage amounting to about 1500 miles.

GOVERNMENT AND RELIGION. The executive department of the government consists of a lieutenant governor and a council of six members. The lieutenant governor is appointed by the governor-general of Canada, with the advice of his council, for a term of five years. The legislature consists of a house of assembly of 46 members, elected for four years. All local administration is through the county councils.

The inhabitants are largely of English descent, and in religion they are divided between Catholicism and the various Protestant denominations, the Catholic Church having about one-third of the membership of the province. Among the Protestant denominations, the Anglican Church, Presbyterians, Methodists and Baptists have the largest number of communicants.

EDUCATION. The public school system is controlled by an educational council, of which the provincial superintendent is the head. There are no separate schools for Catholics and Protestants. The courses of study, the methods of instruction and the text-books are uniform throughout the province, and in addition to the elementary schools, normal schools are maintained. The province also provides for those students who wish to pursue a course of study at the University of Fredericton. There are a number of denominational colleges.

INSTITUTIONS. There is a general hospital at Saint John, also an industrial home for boys, besides institutions for the deaf and dumb. Hospitals for the insane are maintained in different parts of the province. There is no provincial penitentiary, but convicts are sent to the Dominion penitentiary at Dorchester, an institution maintained by the maritime provinces of the Dominion.

CITIES. The chief cities are Fredericton, the capital, and Saint John, each of which is described under its title.

HISTORY. New Brunswick was discovered by Sebastian Cabot in 1498 and with Nova Scotia formed the French colony of Acadia, which continued from 1604 to 1713, during which time it was alternately a possession of the French and the English. In 1713, by the Treaty of Utrecht, it became a British province, but the boundaries were not determined until the Treaty of Paris, which closed the French and Indian wars. In 1755 a large number of the French inhabitants were compelled to leave the province because of their sympathies with the French. In 1784 Nova Scotia was detached, and New Brunswick became a separate province. At the formation of the Dominion of Canada in 1867, New Brunswick entered the federation. Population in 1901, 331,120.

New Brunswick, N. J., the county-seat of Middlesex co., 30 mi. s. w. of New York City, on the Raritan River and the Delaware & Raritan Canal and on the Pennsylvania and the Raritan River railroads. It is the seat of Rutgers College, of the Theological Seminary of the Dutch Reformed Church and of the state agricultural and mechanical college. The city also has a public library, the Sage Library, Saint Agnes Academy and homes for orphans and aged. The place was settled as Prigmore's Swamp in 1681 and was known as Inion's Ferry from 1697 to 1714, when it was named in honor of the House of Brunswick. It was chartered as a city in 1784. In the Revolution it was the scene of numerous conflicts and was held by the British during the winter of 1776–1777. Population in 1905, 23,133.

New'burgh, N. Y., a city in Orange co., 60 mi. n. of New York City, on the Hudson River, 5 mi. above the Highlands, and on the Erie, the West Shore, the New York Central and other railroads. There is a considerable trade in coal and agricultural and dairy products, and the city contains manufactures of cottons, woolens, silks, paper, hats, carpets, ships, leather and other articles. The municipality has a public library, a park, Saint Luke's Home and Hospital, a home for the friendless and a home for children. Hasbrouck House, occupied by Washington for a time during the Revolution, is now used as a museum for war relics. The revolutionary army was disbanded here, and a large stone structure, known as the Tower of Victory, has been erected by the Federal and state governments to commemorate the successful termination of the war. The place was settled by German Lutherans in 1709, was made a village in 1800 and was chartered as a city in 1865. Population in 1905, 26,498.

Newburgh Addresses, several anonymous letters published at Newburgh-on-the-Hudson, while the Continental army was in camp there, after the close of the Revolutionary War. They were the result of a widespread feeling of discontent, on account of the failure of Congress to provide for the payment of the soldiers. The addresses called for a meeting of officers to consider a means of enforcing their claims, urged the army not to disband until these were satisfied and to appeal "from the justice to the fears of the government." Through Washington's influence, the meeting was controlled in the interests of the government, and later Congress made a satisfactory settlement with the army.

New'buryport, Mass., one of the county-seats of Essex co., 37 mi. n. e. of Boston, on the Merrimac River and on the Boston & Maine railroad. The city has a good harbor, ships considerable coal and contains manufactures of boots, shoes, cotton cloth, silverware, machinery, hats and other articles. In the days of wooden boats, there were large shipyards here, and some small boats are even yet constructed. There is a public library, a marine museum, the Putnam Free School, Anna Jaques Hospital, the Dexter House and homes for old ladies and children. Other places of interest are the house in which William Lloyd Garrison was born; the Old South Church, which contains the remains of George Whitefield; Washington Park, and an old chain suspension bridge, built in 1792. The place was settled in 1635, was incorporated as a separate town in 1764 and was chartered as a city in 1851. Population in 1905, 14,675.

New Cal'edo'nia, an island in the Pacific, situated about 850 mi. from Australia and about the same distance from New Guinea. Its area is 7650 square miles. The interior of the island is mountainous, and the surface is largely covered with luxuriant forests. There are nickel mines and mines of copper and of cobalt, and these minerals are exported in considerable quantities. Wheat, maize, coffee, cocoanuts and vanilla are the chief productions. The island was discovered by Captain Cook in 1774 and was seized by the French in 1854. Ten years later a penal colony was founded on the island, but the frequent escape of convicts to Australia has been a source of trouble and international dispute. Population in 1901, 51,415, of whom over 12,000 were free Europeans and over 10,000 convicts.

Newcastle, *new'kas'l,* a city and shipping port of New South Wales, on the Hunter River, 102 mi. n. of Sydney, with which it is connected by rail. It is the chief port for the northern region of New South Wales and is an important coaling station. The trade in coal, wool and frozen meats is considerable, and there are manufactures of carriages, boots and other articles. Newcastle is the seat of a United States consul. Population in 1901, 14,250.

Newcastle, Pa., the county-seat of Lawrence co., 50 mi. n. w. of Pittsburg, at the confluence of the Shenango and the Neshannock rivers, on the Pennsylvania, the Erie, the Baltimore & Ohio and other railroads. The city is an important railroad center in an agricultural district, which also contains deposits of coal, limestone, sandstone, fire clay and iron ore. There are extensive manufactures of iron, glass, brick, nails, machinery, paper and other articles. Cascade Park is a popular resort. The Y. M. C. A. maintains a public library. The place was settled in 1812 and was chartered as a city in 1869. Population in 1900, 28,339.

Newcastle-upon-Tyne, a river port, parliamentary borough, municipal county and episcopal city of England, in the County of Northumberland, about 60 mi. n. e. of Liverpool. The most noteworthy buildings of the city are the Church of Saint Nicholas, the guildhall, the townhall and the jail. Schools of medicine, science, mechanics and mining engineering are located in Newcastle, which also possesses a natural history museum and a public library of about 120,000 volumes. Owing to the rich mineral products of the neighborhood, Newcastle has attained a first position among the centers of British enterprise. Some of the more important of its industries are shipbuilding and the manufacture of locomotive and marine engines, cannon, shot, tools, hemp and wire ropes, cables, anchors and sails. Situated in the midst of one of the largest coal fields in England, it exports immense quantities of coal. Population in 1901, 215,328.

Newcomb, *nu'kom,* Simon (1835-1909), an American astronomer and mathematician, born in Nova Scotia. He came to the United States when he was thirteen years old. In 1858 he graduated from the Lawrence Scientific School at Harvard, and in 1861 he was appointed professor of mathematics in the United States navy and assigned to duty at the Naval Observatory. He was secretary of the commission which observed the transit of Venus in 1874 and in 1882, and he observed the latter at the Cape of Good Hope. In addition to this he directed the observations of several eclipses, beginning in 1860. In 1897, at the age of 62, he retired from the navy and afterwards devoted himself to scientific pursuits. He was editor of the *American Journal of Mathematics*, professor in Johns Hopkins University and a member of numerous royal academies and scientific associations of Europe and America. In many of the American associations he has held the position of president or other important offices, and in 1904 he was president of the International Congress of Arts and Sciences which convened at Saint Louis. In 1874 the Royal Astronomical Society gave him their medal, in 1878 he received the Huygens medal, in 1890 the Copley medal of the Royal Society and in 1898 the Bruce medal of the Astronomical Society of the Pacific. Other honors and distinctions have been conferred upon him, and he is generally recognized as the leading authority in his department.

His lesser publications are numerous in many scientific journals. Among his large and important scientific works are *An Investigation of the Orbit of Neptune*, *Researches on the Motion of the Moon* and *Measure of the Velocity of Light*. Besides these, he has written a number of books of a popular nature which have much enhanced his reputation among general readers. Among these are his *Popular Astronomy*, *School Astronomy*, *The Stars*, *Astronomy for Everybody* and *Reminiscences of an Astronomer*.

Newcom'en, Thomas (1663–1729), an English locksmith, born at Dartmouth, in Devonshire. The merit of first applying the steam engine to practical purposes is due to Newcomen, who, in conjunction with Captain Savery and John Cowley, took out a patent in 1705.

New England, the northeast portion of the United States, comprising the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut. Originally called North Virginia, when granted by James I to the Plymouth Company in 1606, it received the name New England from Captain John Smith, who explored and made a map of the coast in 1614.

New England Confed'era'tion, a union formed by the colonies of Plymouth, Massachusetts Bay, Connecticut and New Haven in 1643, under the title *United Colonies of New England*. Its purpose was to secure united action against the indians, the Dutch, the French and, probably, the mother country. During the first twenty years of the union, the confederation was an important force in the colonies, but after that time it rapidly declined, owing to factional disputes and the weakness of its constitution, and it went out of existence in 1684.

Newfoundland, *nu'fund land*, a large island of British North America, in the Atlantic Ocean at the mouth of the Gulf of Saint Lawrence. Its area is estimated at about 40,200 square miles. Its irregular coast affords numerous safe and sheltered harbors. The largest rivers are Humber River, the River of Exploits, the Gander, the Terra Nova and the Salmon. The largest lakes are Grand and Red Indian lakes. The interior of the island has never been fully explored, but it seems to be a rough plateau, much broken up by rivers and covered with a vegetation which is by no means luxuriant. The minerals comprise coal, gypsum, lead, nickel, silver, iron and copper, this last the most important of the minerals. The wild animals are the caribou, or reindeer; the bear, the wolf, the hare, the beaver, the marten and the wild cat. The Newfoundland dog is the only animal peculiar to the island. The famous Banks of Newfoundland swarm with almost every variety of fish, particularly cod. The cod fishing is carried on from June to November and may be said, with the other fisheries of seal, lobster, herring and salmon, to form the staple occupation of the inhabitants. Codfish is by far the largest export. The trade is chiefly with England, Canada and the United States.

The affairs of the colony are administered by a governor, appointed by the British crown; an executive council of nine members; a legislative council of fifteen members, nominated by the governor; and a house of assembly of thirty-six representatives. The religion is chiefly divided between the Anglican, the Roman Catholic and the Wesleyan bodies, and the educational system is almost entirely denominational.

It is supposed that Newfoundland was discovered about the year 1000 by the Northmen. It was rediscovered by John Cabot in 1497, and in the following century the English took possession of the island. A struggle for supremacy took place between the English and the French, and this interfered with the establishment of permanent settlements on the island. In 1713 Newfoundland and its dependencies were declared by the Treaty of Utrecht to belong wholly to Great Britain, the French reserving a right to fish on certain parts of the coast. Responsible government was granted in 1833. The only noteworthy town on the island is Saint John's, the capital. Population of the island in 1901, 217,037.

Newfoundland Dog, a large, handsome dog, introduced from the island of Newfoundland. It is usually black or black and white in color, with large, drooping ears and bushy tail, and in general appearance it is very imposing. It is a splendid water dog, takes to the sea at an early age and has often saved the lives of human beings in danger of drowning. In Newfoundland these dogs are used as beasts of burden and haul wood and provisions on sledges. On account of its great size, its intelligence and its bravery, the Newfoundland dog makes a fine watch dog.

NEWFOUNDLAND DOG

New'gate, a celebrated prison in London, so named because it was located at the new gate of the city. It was probably built at the beginning of the twelfth century. It was destroyed and rebuilt a number of times and has always been of historic interest, because of the many eminent men that were confined in it for political or religious reasons. The building was demolished in 1902.

New Guinea, *gin'ee,* or **Pap'ua,** a large island of the Eastern Archipelago, situated north of Australia, from which it is separated by the Torres Strait. Its area is estimated at 313,183 square miles, and it is, next to Greenland, the largest island on the globe. The interior has never been thoroughly explored, but it is known that it is to a large extent mountainous. The largest river is the Fly, which is about 620 miles long and is navigable by steam launches for 500 miles. There are several other navigable rivers, of which, however, little is known as yet. The climate is hot and unhealthful in the lower altitudes, but is usually agreeable at points above 3500 feet.

In the south of the island are found great forests of cypress, cedar and ebony, and the cultivated plants include rice, sugar, maize, yams, bananas and breadfruit, coffee and tobacco. Commercially the island is as yet of small importance, almost the entire trade being between British New Guinea and Queensland, New South Wales.

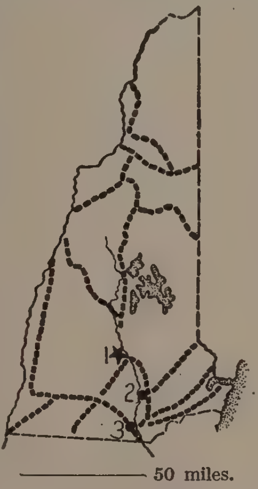
Politically the island is divided into British New Guinea (estimated area, 90,540 square miles), Kaiser Wilhelmsland (estimated area, 70,843 square miles) and Dutch New Guinea (estimated area, 151,800 square miles). The British territory is governed by an administrator and a legislative council, and much is being done to advance the trade of the territory and to improve the natives. A German company, known as the German New Guinea Company, has as its object the development of the resources of Kaiser Wilhelmsland, but as yet the territory has been by no means made to pay expenses. The Dutch have done little or nothing for their portion of the island. Population of the entire island, estimated at about 750,000.

The discovery of New Guinea was made by the Portuguese in the sixteenth century, but little attention was paid to it until recently. The naturalists were the first to make incursions into the interior, and the missionaries came next. Germany and the Australian colonies also began to take an interest in New Guinea, and the latter urged the home government to annex the eastern portion of the island, the western part having long been recognized as Dutch territory. The final division of the island between Great Britain, Germany and Holland was settled in 1885.

New Hamp'shire, the GRANITE STATE, one of the New England states, bounded on the n. by the Province of Quebec, on the e. by Maine and the Atlantic Ocean, on the s. by Massachusetts and on the w. by Vermont, from which it is separated by the Connecticut River. The greatest length is 178 mi., and the greatest width, 100 mi.; the area is 8315 sq. mi. Population in 1900, 411,588; estimated in 1905, about 415,000.

SURFACE AND DRAINAGE. The state is rugged and mountainous in the northern part, but the southern part is composed of broad valleys and low hills. The White Mountains occupy the north central part of the state; they cover an area of about 1400 square miles and constitute its most striking physical feature. They are a part of the Appalachian system and are divided by the valleys of the Saco and the Ammonoosuc rivers, whose valleys form the famous "Notch," into two ranges, known respectively as the White and Franconia ranges (See WHITE MOUNTAINS). Mount Washington, 6286 feet, is the highest point near the Atlantic, north of Mount Mitchell, North Carolina. These mountains abound in dense forests, deep gorges, clear streams and picturesque nooks and glens. In the Franconia range is found the "Old Man of the Mountain," a profile formed by projecting rocks and measuring more than eighty feet from forehead to chin. Because of its beauty the White Mountain region is often called the "Switzerland of America."

The Connecticut and its tributaries drain the western and northern regions, and the Merrimac and Piscataqua drain the southern and southeastern portions. The banks of the Merrimac are lined with manufactories, and this river is said to turn more spindles than any other in the world. The Piscataqua remains open from Dover to its mouth the entire year and forms the only harbor in the state. Numerous small lakes, noted for their beauty, are scattered over the state. Lake Winnepesaukee, in the south central part, the largest, is 19 miles long and 8.25 miles wide and contains 264 islands.



NEW HAMPSHIRE
1, Concord; 2, Manchester; 3, Nashua.
Dotted lines indicate chief railroads.

Climate. New Hampshire has a typical New England climate. The winters are severe, and in the northern half snow usually falls to a great depth. The summers are mild and pleasant. The mean annual temperature at Concord is 48°. The annual rainfall, including snow, is 45 inches.

Mineral Resources. Gold, silver, copper, lead, zinc and other ores are found, but in such small quantities and so inaccessible that they cannot be mined with profit. Granite, soapstone and mica are quarried in large quantities. New Hampshire produces nearly four-fifths of the output of mica of the United States. Slate, clay, porphyry and limestone are also found.

Agriculture. In general, the soil is poor, but along the Connecticut and in the valleys of other streams good farms are found. Much of the state is covered with forests, from which most of the valuable timber has been cut. Where these forest areas have been cleared, especially in the northern portion of the state, the soil yields good crops. The farms are small and diversified farming is general. Dairy products, live stock, poultry, wool, oats, hay and potatoes are the chief agricultural products.

Manufactures. Manufacturing is the leading industry. It is estimated that there are 2000 water powers in the state, and most of them are employed. The leading manufactories are in the southern part, where abundant water power, proximity to good markets and excellent shipping facilities are greatly to their advantage. The leading manufactures are cotton goods, boots and shoes, woolen goods, lumber and paper and wood pulp. Manchester, Nashua and Portsmouth are the chief manufacturing centers.

Transportation. Numerous lines of railway traverse the valleys, and nearly every town of importance has ready access to one or more of these lines. With few exceptions, the railways are controlled by one of the following systems: the Boston & Maine, the Maine Central and the Grand Trunk. The Mount Washington railway makes an ascent of 3625 feet in 2¾ miles, and it is the first of its kind ever constructed. It is operated during the summer for the benefit of tourists.

Government. The legislature consists of a senate of 24 members, distributed among 24 senatorial districts. The house of representatives consists of members apportioned according to population, all towns, cities and wards having 600 inhabitants being entitled to one representative, while districts having less than 600 inhabitants are entitled to a representative for a part of the legislative term corresponding to the ratio of their population to 600. The members of both houses are elected for two years. The executive department consists of the governor and a council of five members, chosen by popular vote, and a secretary of state, a treasurer and a commissary general, chosen by joint ballot of the senate and house of representatives. The judicial department consists of one supreme court, with a chief justice and four associate justices, and a superior court, with a chief justice and four associate justices, all appointed by the governor and council. Each county has a probate court, and justices of the supreme court hold courts in the different counties during the year.

Education. There is a good system of common schools, but, being one of the older states, New Hampshire did not receive the benefit of a school fund from the sale of public lands. Consequently, nearly all of the fund for the support of public schools has to be raised by local taxation. The average length of the term in the rural schools is about seven and a half months. All towns and cities have excellent systems of graded schools. The system of education is in charge of a superintendent of public instruction, appointed by the governor and confirmed by the council. The state normal school is at Plymouth and the state agricultural college is at Durham. Dartmouth College at Hanover is the most important educational institution in the state and one of the leading colleges of the country (See DARTMOUTH COLLEGE). Saint Anselm's College at Manchester is the leading Roman Catholic school.

INSTITUTIONS. There is a school for feeble-minded children at Laconia, an orphans' home at Franklin, a hospital for the insane at Concord, and the penal institutions include the state's prison at Concord and the industrial school at Manchester.

CITIES. The principal cities are Concord, the capital; Manchester, Nashua, Dover, Portsmouth, Rochester, Claremont and Franklin, each of which is described under its title.

HISTORY. New Hampshire was first settled about 1623 by fishermen from Massachusetts, in the neighborhood of Dover and Portsmouth. It was granted to George Mason (See MAINE), but his claims were afterwards silenced, and the colony voluntarily united with Massachusetts and remained so with slight interruptions until 1741. New Hampshire took a leading part in the pre-Revolutionary discussion and furnished more than its quota of soldiers to the Continental armies. It was among the first states to adopt an independent constitution, and its ratification of the Federal Constitution in 1788 assured the final adoption of that instrument. Before and during the Civil War, the sentiment of the state was strongly anti-slavery, and it furnished its full quota of troops to the Union armies. It has since been stanchly Republican in politics.

New Ha'ven, CONN., a city and the county-seat of New Haven co., the largest city of the state, at the head of New Haven Bay, 4 mi. from Long Island Sound, on the New York, New Haven & Hartford railroad, 73 mi. e. n. e. of New York and 36 mi. from Hartford. Its area is about 23 square miles, and it is built on a level plain, which is bordered on the east and west by the Quinnipiac and the West rivers. Of the two spurs of the enclosing line of hills, East Rock and West Rock, the former has been made into a picturesque park. At the summit of the rock stands a soldiers' and sailors' monument. The entire park system includes almost 1200 acres. One of the most striking characteristics of New Haven is the great number of magnificent elm trees which border many of the chief streets and which have given to the town its popular name of the "City of Elms." The "Old Green," the center of the city as originally laid out, is surrounded by these great trees.

At New Haven is located Yale University (See YALE UNIVERSITY), with its numerous buildings and schools. The other educational institutions include the Hopkins Grammar School, Hillhouse High School, Boardman Manual Training School and a state normal school. Of the charitable institutions, the most noteworthy are the New Haven Hospital, the Grace Hospital, the Saint Francis Roman Catholic Orphan Asylum and the New Haven Orphan Asylum. The city possesses a public library of more than 52,000 volumes, as well as a number of learned societies. There are in the city about seventy churches, some of which were built at the very beginning of the nineteenth century. In the old burying ground in Grove Street are the graves of Noah Webster, Theodore Winthrop, Timothy Dwight, Eli Whitney, Samuel F. B. Morse and other distinguished men of the city.

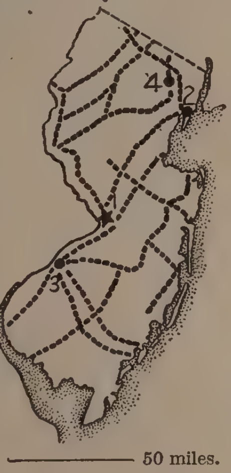
Until the middle of the nineteenth century, New Haven was a ship-building center of importance, but this industry has considerably declined. The city has a fine harbor and a considerable coastwise and internal trade, as well as a large foreign commerce, both direct and through New York. New Haven is one of the important industrial centers of Connecticut and has manufactures of firearms, edge tools, wire goods, carriages, clocks, engines and boilers, corsets, musical instruments and paper. There are also planing mills and slaughtering and packing houses. In 1638 a company of Puritans, under Theophilus Eaton and the Reverend John Davenport, settled at the place, called by the indians Quinnipiac. Two years later the town was given the name of New Haven, and it became the capital of the independent "New Haven Colony." In 1665 this was united with the Connecticut colony, of which in 1701 it was made a joint capital with Hartford, retaining this position until 1873. A force of British took the town on July 5, 1779, about 70 British and 29 Americans losing their lives in the conflict. In 1784 New Haven was incorporated as a city. Population in 1901, 108,027.

New Hebrides, *heb'ri deez,* a long chain of volcanic islands in the Pacific Ocean, lying north of New Caledonia and west of the Fiji Islands. Their total area is about 5100 square miles. They are fertile, and produce cocoanuts, breadfruits, bananas, pineapples, oranges and sandalwood. The climate is unhealthful, even for the natives. The population is about 50,000 and is made up mostly of savages.

New Ibe'ria, La., the parish-seat of Iberia parish, 125 mi. w. of New Orleans, on the Bayou Teche, at the head of navigation, and on the Southern Pacific railroad. The town is in an agricultural district, producing sugar cane, cotton, rice, corn, potatoes, small fruits and vegetables. The industrial establishments include lumber mills, machine shops, knitting mills, shipyards, foundries, sash and blind and other factories. A part of the scene of Longfellow's *Evangeline* was laid in this section. The city has a Federal building, a high school, a library, a fine town hall and a market. Population in 1900, 6815.

New Ire'land. See Neumecklenburg.

New Jersey, *jur'zy,* one of the Middle Atlantic states, bounded on the n. by New York, on the e. by New York and the Atlantic Ocean on the s. by Delaware Bay and on the w. by Pennsylvania, from which it is separated by the Delaware River. It is separated from New York on the e. by the Hudson River and Staten Island Sound. The extreme length of the state is 167 mi.; its average width, 50 mi.; its area, 7815 sq. mi., of which 290 sq. mi. are water. Population in 1905, 2,144,143.



NEW JERSEY
1, Trenton; 2, Jersey City; 3, Camden; 4, Paterson.
Dotted lines indicate chief railroads.

Surface and Drainage. The state is divided into four physiographic regions, three of which are in the northern part, and consist of belts extending northeast and southwest. First is the Appalachian belt, including the Kittatinny Mountains, a prolongation of the Blue Mountains, and Kittatinny valley, an extension of the great Appalachian valley. These mountains are about 1800 feet in height. The cut through them by the Delaware River forms the famous Delaware Water Gap (See Delaware Water Gap). Next comes the Highland belt, a succession of plateau-like masses. Then follows the Piedmont plain, including a variety of type forms, one of which is the famous Palisades. The fourth region includes all that part of the state lying south of a line running from Raritan Bay to Trenton, and is a belted coastal plain, of which no altitude is greater than 400 feet.

The western part of the state is drained by the Delaware River, into which flow numerous short tributaries. The rivers flowing into the Atlantic in the southern part of the state are characterized by broad estuaries. To the north, the Raritan flows into Raritan Bay, and in the northeastern section are the Passaic and the Hackensack, flowing into Newark Bay.

Climate. New Jersey has a mild temperate climate, varying considerably between the northern and southern parts of the state. In the eastern part of the state the temperature is modified by sea breezes, which, meeting land breezes, often produce oppressive humidity. The mean annual temperature at Atlantic City is about 52°, and the annual rainfall is 49 inches.

Mineral Resources. There are quite extensive beds of iron ore in the highland belt of the state, and these have been worked for many years, though the opening of more extensive iron regions around the Great Lakes has lessened the relative importance of the production of the New Jersey mines. Large quantities of zinc ore are also obtained in the state, and in the production of zinc it is second only to Missouri. Among other minerals of importance are limestone and clays suitable for brick and pottery. Large quantities of rock suitable for the manufacture of Portland cement are also found, and this product is extensively manufactured. Another important mineral product is pottery clay, in the production of which New Jersey ranks second among the states. In the southern part of the state, sand suitable for glass-making is found.

Fisheries. Its extensive coast line makes New Jersey a favorable location for fishing industries. Many are engaged in oyster farming, and clams, shad, bluefish, cod and menhaden are taken in large quantities. The canning of small menhaden, under the name of sardines, constitutes an important industry in some localities.

Agriculture. The soil of the state is

generally fertile and easily tilled. There is an abundance of moisture, and the climate is suitable to the production of fruits, vegetables and cereals. Because of the nearness to New York, Philadelphia and Baltimore, all localities have the advantage of good markets, and the raising of fruit, vegetables and other garden products is an important branch of the agricultural industry. Large quantities of tomatoes and sweet potatoes are produced. Among the cereals, corn, oats, rye and wheat are the most important. In those areas containing good grazing land, dairying is practiced to some extent, though it cannot be considered one of the leading agricultural industries. Among the orchard fruits, apples and peaches are produced in largest quantities. New Jersey is known for its cranberries, which are grown on the marsh lands along the coast, the state producing fully one-half of the entire crop of the country.

Manufactures. Considering its size, New Jersey is one of the leading manufacturing states. Most of these industries are located in the northern part of the state. Those of the greatest importance are the manufactures of silk goods, cotton and woolen goods, iron and steel products, machinery, including sewing machines, pottery, in which the state is second in the Union, terra cotta and tile. In many of the cities there are extensive works for the manufacture of chemicals, distilled liquors and tobacco products. Other localities are also given to the manufacture of jewelry, and glass is manufactured to some extent in the southern part of the state.

Transportation and Commerce. New Jersey is remarkably well supplied with railroads, since, in addition to the local roads, several of the trunk lines running to New York pass through the state. There are also two important canals, the Morris Canal, leading from Jersey City to the Delaware River at Philipsburg, and the Delaware-Raritan Canal, connecting the Delaware River with Raritan Bay. Both of these are extensively used in the transportation of coal. The Delaware is navigable for ocean steamers as far as Philadelphia and for other boats to Trenton. The coast contains several good harbors, so that the state is provided with water transportation.

The commerce consists of the export of fruits, vegetables and manufactured articles and the importation of raw materials and manufactured food products. Much of the commerce between New York, Philadelphia and the West passes through the northern part of the state.

Government. The legislature is composed of 21 senators, one from each county, elected for three years, and an assembly of not more than 60 members, apportioned among the counties according to population, and elected for one year. The legislature meets annually. The executive power is vested in a governor, elected for three years. The chief state officers are a treasurer and a comptroller, elected for three years by the senate and assembly in joint session. A secretary of state, an attorney-general, an adjutant general, a commissioner of banking and insurance, a clerk in chancery, a clerk of the supreme court and a superintendent of public instruction are appointed by the governor, with the approval of the senate.

The judicial power consists of the court of errors and appeals, court of chancery, supreme court, circuit court, prerogative court, impeachment court, court of pardons and certain inferior courts, namely, common pleas, orphans' court, justice court, city district court and criminal court. The judges and chancellor are appointed by the governor, the vice-chancellors by the chancellor. The terms of office of the chancellor and supreme court judges are seven years. Those of the other judges are for varying lengths of time.

The court of errors and appeals consists of the chancellor, the justice of the supreme court and six other judges especially appointed. The supreme court consists of a chief justice and eight associate justices.

Education. The public schools are under the management of a state board of education consisting of two members from each congressional district, 20 in all, appointed by the governor and confirmed by the senate, for the term of five years. Their secretary *ex-officio* is the state superintendent, who sits with them, without a vote. The latter is appointed by the governor for a term of five years. This board has control of the normal school, the school for the deaf and the various other schools known as state schools. They make rules for the enforcing of the school laws of the state, appoint a state high school inspector and county superintendents, regulate teachers' institutes, decide appeals and make rules for the examination of teachers. There are also city, borough and township boards, with their supervisors, and the powers usual to such boards. The schools are graded into high, grammar and primary, and are kept open for an average term of over nine months. There is a state normal school at Trenton, and one is about to be erected at Upper Montclair. The state agricultural and scientific school is connected with Rutgers College, New Brunswick. Other institutions of importance are Princeton University, Princeton; Stevens Institute of Technology, Hoboken; Seton Hall College, South Orange; Centenary Collegiate Institute, Hackettstown; Blair Presbyterian Academy, Blairstown; Pennington Seminary, Pennington; Lawrenceville School, Lawrenceville; Peddie Institute, Hightstown, and Drew Theological Seminary, Madison.

INSTITUTIONS. The following are the principal public institutions: The school for the deaf at Trenton, the state prison at Trenton, the reformatory at Rahway, a home for boys at Jamesburg, a home for girls at Trenton, a home for disabled soldiers at Kearny, a home for disabled soldiers, sailors, marines and their wives at Vineland, state hospitals for the insane at Trenton and Morristown, village for epileptics at Skillman and homes for feeble-minded women and children at Vineland.

CITIES. The chief cities are Trenton, the capital; Jersey City, Camden, Elizabeth, Hoboken, Newark, New Brunswick, Paterson and Orange, each of which is described under its title.

HISTORY. The first settlement in New Jersey was made by the Dutch, about 1617. Thereafter it was settled successively by the Swedes and the English, who, with the Dutch, maintained a continuous warfare for the control of the territory until 1664, when the English gained control. It was granted by Charles II to the duke of York and by him to lords Berkeley and Carteret. By them it was divided into two territories, East and West Jersey, and in 1682 an organization, chiefly of Quakers under William Penn, bought East Jersey, but later relinquished their rights, and the two territories were reunited in 1702. During the French and Indian wars, New Jersey loyally supported the English cause, but in the Revolution it contributed, besides its militia, more than ten thousand men to the Continental army. It was the scene of some of the most important campaigns of that war and suffered heavily. In the constitutional convention, the delegates of New Jersey steadily opposed the establishment of a strong central government, the so-called *New Jersey plan* contemplating a union that was to have little authority over the states. However, it was among the first to ratify the Federal Constitution (December, 1787). In the slavery struggle the state was generally hostile to the institution and furnished its full quota of men to the Union armies. The chief issues in the state politics after the war have been those connected with the taxation and control of corporations. The state has generally been Republican in national politics. Consult Lee's *New Jersey as a Colony and as a State.*

New'lands, FRANCIS GRIFFITH (1848–), an American politician, born at Natchez, Miss. He attended Yale College and the Columbian College Law School at Washington and began the practice of law at San Francisco, where he remained until 1888. In that year he removed to Nevada, was elected for five successive terms to the lower house of Congress and served on most important committees. In 1903 he was chosen to the Senate, where he was the author and champion of an important irrigation bill.

New London, *lun'don,* CONN., one of the county-seats of New London co., 50 mi. e. of New Haven, on the New York, New Haven & Hartford and the Central Vermont railroads, and on the Thames River, about 3 mi. above Long Island Sound. It is a beautiful residence place and a popular summer resort. There are regular steamboats to New York, and the city has a good harbor, with forts Trumbull and Griswold at the entrance. The place was once famous as a whaling port and is still interested in fishing. The various industrial establishments include machine shops, foundries, printing-press works, silk and woolen mills, shipyards and furniture and other factories. The city has several parks, a handsome public library and the library of the county historical society. The place was settled in 1646 by John Winthrop and was known as Naumeag until 1658. In 1781 Benedict Arnold with a large British force, assisted by a fleet, attacked the city, killed a number of the inhabitants and burned most of the wharves and stores. A shaft 127 feet high has been erected as a memorial to the victims. Other places of historical interest are the Hempstead House, one of the oldest in the state; the old town mill, erected in 1646 and still in operation, and the little school in which Nathan Hale was teacher. Population in 1900, 17,548.

New'man, JOHN HENRY, Cardinal (1801–1890), a Catholic divine, born in London and educated at Ealing and Trinity College, Oxford, where he graduated with classical honors in 1820.

He was elected fellow of Oriel College. He was vice-principal of Saint Alban's Hall (1825–1826) under Doctor (afterward Archbishop) Whately, and later became tutor in his own college. He was vicar of Saint Mary's, where he gained great power over the people by his sermons, and was later chaplain of Littlemore (1828–1843). During this last period he took part with Keble and Pusey in originating the Oxford movement; was a leader in the propaganda of High Church doctrines and contributed largely to the celebrated *Tracts for the Times*. The last of these, on the elasticity of the Thirty-nine Articles, was censured by the university authorities and was followed by Newman's resignation of his offices in 1843 and secession to the Church of Rome in 1845. Newman was ordained a priest of that Church and became head of the oratory of Saint Philip Neri at Birmingham, rector of the Roman Catholic University of Dublin (1854–1858) and principal of the Roman Catholic school at Edgbaston. In 1879 he was created a cardinal. He wrote some remarkable works sustaining the doctrines of the Church of Rome, particularly the *Apologia pro Vita sua* (1864) and the reply to Mr. Gladstone (1875) on the *Vatican Decrees*. He is the author of the well-known hymn, popular in all denominations, *Lead, Kindly Light*.

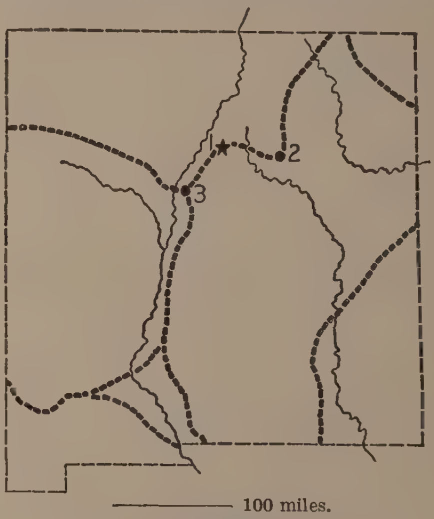
JOHN HENRY NEWMAN

New Mex'ico, a territory in the southwestern part of the United States, bounded on the n. by Colorado, on the e. by Oklahoma and Texas, on the s. by Texas and Mexico and on the w. by Arizona. It has an area of 122,460 sq. mi. The population in 1900 was 195,310, of which 13,144 were indians.

Surface and Drainage. The surface belongs to the great plateau upon which rests the Rocky Mountain system. From an altitude of 7000 feet in the north, it descends gradually to 3500 feet in the southeast. Except in the east, the whole region is traversed by broken ranges of mountains, with a north and south trend. Some peaks reach a height of from 8000 to 13,000 feet.

New Mexico, while generally requiring irrigation for its cultivation, is more fully provided with rivers than any of the other mining states or territories. The Rio Grande passes completely through the center of the territory from north to south and receives many tributaries. The northeastern part of the territory is drained by the Red River and its numerous branches. The Pecos rises northeast of Santa Fé and flows south across the Texas line, finally joining the Rio Grande. In the northwest is the Rio San Juan. In the central west are the head waters of the Little Colorado, and in the southwest are those of the Gila.

Climate. The delightful and healthful air of this territory has given it repute as a health resort. The mean temperature at Santa Fé is 48°, the extremes being from 1° below zero to 70° above zero. The average rainfall is from 15 to 17 inches, and irrigation is necessary for successful agriculture.



NEW MEXICO
1, Santa Fé; 2, Las Vegas; 3, Albuquerque.
Dotted lines indicate chief railroads.

Agriculture. The greater portion of New Mexico is pasture land, and stock raising, next to mining, is the chief industry. Wherever there is sufficient water, either in streams or in springs, to supply the wants of animals, the grass is amply sufficient to support either cattle or sheep. New Mexico produces more sheep than any other state or territory in the Union, except Montana. The supply of timber, especially pine, is almost inexhaustible. It exists in nearly all the hilly and mountainous parts of the territory. Large crops of grain and most kinds of vegetables, especially onions, beets, turnips, cabbages and cauliflowers, are largely produced. Potatoes succeed best in the mountainous regions. The Taos valley is an exceptionally fine wheat country. It is as a fruit-producing region, however, that a large portion of the irrigated land of the territory especially excels. The area of fruit and vine culture is being yearly extended. Peaches, plums and apricots come to perfection in the north, and pears, apples, quinces, cherries and other fruits are thrifty throughout the middle and southern sections. Grapes flourish from Bernalillo to El Paso and in some favored spots, like La Joya, farther north.

Mineral Resources. Mining operations have been carried on in New Mexico since the discovery of this region by the Spaniards. Nearly all of the mountainous portions of the territory are rich in minerals. Those mined to the greatest extent are coal, gold and silver. Anthracite, bituminous coal and lignite are found, and the yearly output is about 1,500,000 tons. The mining of gold ranks next in importance, and this is followed by silver. Considerable copper is also produced, and in some parts of the territory emeralds, turquoises and other precious stones are found in paying quantities.

Manufactures. The manufactures are limited in extent, but since 1890 they have rapidly increased in number and importance. Most of the industries are connected with the smelting and refining of ore and the construction and repairing of cars and locomotives for the railway lines passing through the territory. There are a number of flour mills in the territory, some sawmills and numerous carpentry and repair shops in various localities to meet the demands of the surrounding population. The production of large quantities of wool has led to the establishing of several plants for wool-scouring. There are also a number of beet sugar factories, distilleries and establishments for canning fruit.

Transportation. The Atchison, Topeka & Santa Fé railway system enters the territory in the northeastern section and extends across it from north to south, following, through a large part of the way, the valley of the Rio Grande River. The western branch of this line extends westward to the Pacific coast. A branch of the Southern Pacific enters the territory from the east and traverses it in a southwesterly direction to El Paso, thence westward into Arizona and then to the Pacific coast. Each of these lines has a number of spurs and cross lines, but the territory as a whole is poorly provided with railway facilities, and most of the transportation is by means of stage lines and pack animals.

Government. See United States of America, subhead *Government*, sub-subhead *Territories*.

Education. A large proportion of the inhabitants of New Mexico are of Spanish descent and speak the Spanish language. Until recently, the proportion of illiteracy among these people has been unusually large, but public schools are rapidly increasing in number and the length of their terms is being extended, so that illiteracy is rapidly diminishing. The University of New Mexico is at Albuquerque, and the College of Agriculture and Mechanic Arts is at Mesilla Park; the school of mines is at Socorro; the normal school is at Silver City; a military institution is at Roswell, and the New Mexico Normal University is at Las Vegas. Besides these, there are a number of schools maintained by missions and various religious denominations, in which excellent work is done. The United States maintains a number of indian schools within the territory.

Institutions. The school for the deaf, dumb and blind is located at Santa Fé, the asylum for the insane is at East Las Vegas and the territorial prison is at Santa Fé.

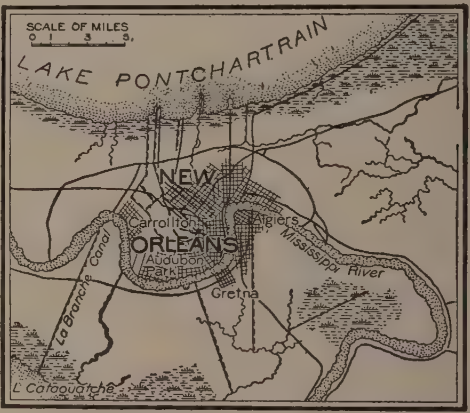
Cities. The chief cities are Santa Fé, the capital, Albuquerque and Las Vegas, each of which is described under its title.

History. Early Spanish adventurers penetrated this territory in 1537, and in 1581 they named it New Mexico. The revolution which overthrew Spanish power in Mexico (1822) also gave freedom to New Mexico, and it was a province of Mexico until 1846. A small United States force under General Kearny captured Santa Fé in the Mexican War, gained control of the whole territory and secured its cession to the United States by the Treaty of Guadalupe Hidalgo, in 1848. New Mexico was organized as a territory in 1851, though its area was changed from time to time by the Gadsden Purchase and by the separation of Arizona and Colorado. During the early part of the Civil War, the territory was the scene of a protracted and bloody strife. After several attempts to gain statehood, Congress, on June 16, 1910, passed an act providing for New Mexico's admission into the Union as a state.

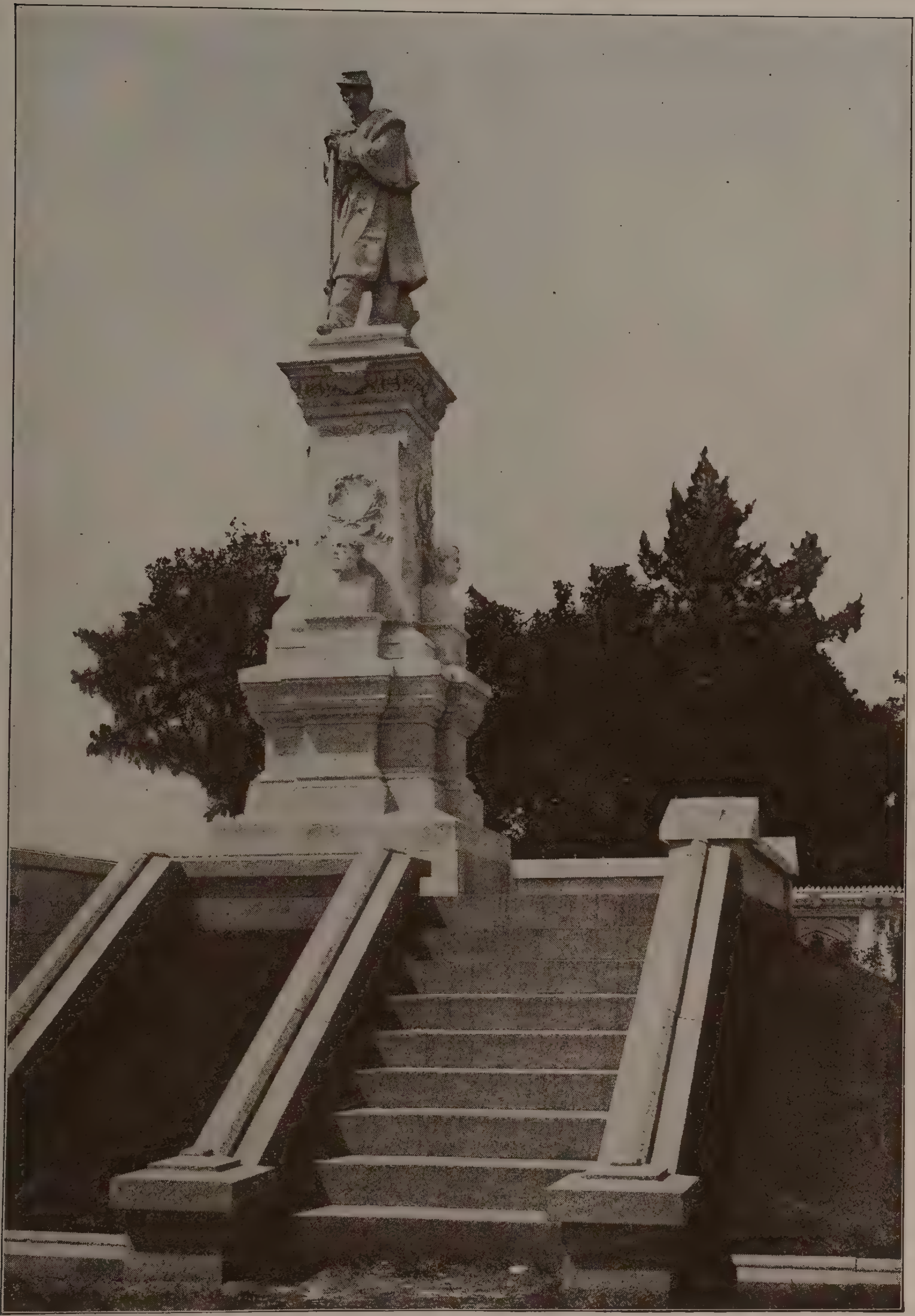
New Mexico, UNIVERSITY OF, a territorial university, located at Albuquerque and established by act of legislature in 1889. It was opened in 1892 and maintains a collegiate department, which includes both classic and scientific courses, and departments in music and art, a business school and normal and preparatory departments. It is co-educational, and women are admitted on equal terms with men. There are over 100 students, and the annual income from state appropriations is about $14,000.

New Orleans, *or'le anz,* the chief city of Louisiana, is situated on the Mississippi River 107 mi. above its mouth, 960 mi. in a direct line s. w. of Washington, 915 mi. s. of Chicago and 639 mi. s. of Saint Louis. It is on the Illinois Central, the Southern Pacific, the Louisville & Nashville, the Texas & Pacific, the New Orleans & Northwestern and several other railroads. The official boundaries of the city include an area of nearly 200 square miles, but only about 41 square miles of this belong to the city proper. The original town was built on a bend in the river, which gave New Orleans the name *Crescent City;* since that time the city has been extended up the stream so that its line on the river now closely resembles the letter *S*. The streets are broad and well kept, and many of them have a profusion of shade trees, so that the city presents a very attractive appearance. Owing to the shape of the river frontage, the streets do not cross at right angles, and this necessitates the introduction of many short streets, which are more or less confusing to a stranger. Canal Street is the principal business thoroughfare. For a portion of its length it contains a plat of grass 25 feet wide and is shaded by numerous palms and other trees. This street divides the city into the old and new sections, or the French section, on the northeast, and the American section, on the southwest. Other streets similarly constructed and affording pleasant drives are Claiborne, Rampart, Esplanade and Saint Charles Avenue. Rampart and Esplanade streets are the principal promenades in the French Quarter. Gravel Road and Saint Charles Avenue afford delightful drives through the residential portions and to Audubon Park.

The most noted parks are Audubon Park, which contains a large number of trees and an extensive conservatory, and City Park, whose area is 160 acres. In connection with these are a number of small parks and circles in the more densely populated portions of the city. The most noted is Jackson Square, formerly known as Place d'Armes, which is on the site of the first settlement made here by the French and which now contains an equestrian statue of General Jackson. Adjoining this are the old Spanish capitol, now the supreme court building, in which took place the ceremony transferring the Territory of Louisiana from France to the United States. A short distance to the west is Lafayette Square, near which are the city hall and a number of other important public buildings. Beauregard Square, formerly Congo Square, was, previous to the Civil War, the favorite resort for slaves.



Among the most noted public buildings is the customhouse, begun in 1848 and constructed of Quincy granite, at a cost of nearly $5,000,000. A portion of the building is occupied by the postoffice. A United States mint; the city hall, one of the most artistic buildings in the city; the Masonic Temple; Odd Fellows' Hall; Saint Charles Hotel; the Sugar Exchange; the Board of Trade; the Baldwin building; the Hennen building; the Howard Memorial Library; the Athenaeum building; the Young Men's Christian Association building, and the buildings of Tulane University, are also notable for architectural beauty. Among the most noted churches



CONFEDERATE MONUMENT, GREENWOOD CEMETERY, NEW ORLEANS

are the Cathedral of Saint Louis (Roman Catholic), the Church of the Immaculate Conception, the Church of Saint John the Baptist, Trinity church, First Presbyterian and the Temple Sinai, the Jewish synagogue. Charity Hospital, one of the largest in the United States, is maintained by the city. The chief educational institutions include Tulane University and the Sophia Newcomb Memorial College for women, and Leland University, Straight University, New Orleans University and Southern University for colored students.

There is a marked contrast between the old section and the new section of the city. In the French Quarter the streets are narrow, the houses small and dingy, with small windows, sanded floors and iron balconies, which usually contain many potted plants. Within are often found articles of furniture that have been handed down from the earliest colonial times. The stores in this quarter are small and consist of shops for the trading of old bronzes, birds, alligators and other curios to tourists and visitors. In this quarter the French language is generally used, though all of the inhabitants can speak English. The French market, located on the levee near Jackson Square, is one of the greatest curiosities of the city. Here in the early morning on week days and from eight to nine o'clock on Sundays can be found all of the different classes and nationalities represented in New Orleans and the vicinity. While French is the prevailing language, nearly all tongues can be heard. The American section is built on modern plans and contains the large business blocks and institutions and some of the finer residences, though many of the most costly homes are west of Audubon Park in the suburb Carrollton. Across the river are two other suburbs, Algiers and Gretna, both residential localities.

New Orleans is one of the great cotton markets of the world, and its position on the Mississippi has also made it an important commercial center and distributing point for the South. The construction of the jetties on the Mississippi (See Mississippi River; Jetty) enables the largest ocean steamers to come to the docks, which stretch along the river front for about six miles. Over thirty lines of steamers give the city direct communication with European ports, and besides the exportation of cotton, much other produce is brought down the river and transshipped here. The city is also growing rapidly as a manufacturing center, its location in the midst of the cotton and sugar regions and the cheap transportation of fuel making it an advantageous point for manufacturing purposes. The chief industries are refining sugar, cleaning rice, the manufacture of clothing, boots and shoes, furniture, cotton goods, tobacco and cigars and cottonseed oil.

History. The city was laid out by Jean Baptiste La Moyne in 1718 and was named for the duke of Orleans, who was at that time regent of France. In 1722 it became the capital of the French territory on the Lower Mississippi. In 1762 it was ceded to Spain, together with other French territory, but the inhabitants objected, and when the Spanish governor arrived four years later he was expelled. This gave rise to considerable trouble, during which the leaders in the revolt were severely punished. In 1800, by the Treaty of Ildefonso, the territory was ceded to France, and in 1803 it became a part of the United States, under the Louisiana Purchase. Near the city the last battle of the War of 1812 was fought (See New Orleans, Battle of). The development of the cotton industry gave the city considerable impetus, and it grew to a population of over 100,000 before the Civil War. At the outbreak of this conflict New Orleans was an important military center for the Confederates, until it was captured in 1862 by the Federal forces, under Farragut and Butler, after which it was used as a base of supplies and a point from which to send military expeditions into the surrounding Confederate territory. During the reconstruction period the city suffered from misgovernment, but with the withdrawal of Federal troops and the reëstablishment of home rule, prosperity returned. Population in 1900, 287,104.

New Orleans, Battle of, the last battle of the War of 1812, fought January 8, 1815, between an American force, under General Andrew Jackson, and a British force, under Sir Edward Pakenham. The latter had come directly from Europe, bringing seven thousand men who had seen service with Wellington in the Napoleonic wars. After several weeks' delay, they advanced upon New Orleans, which was being defended by Jackson with a force of Kentucky and Tennessee backwoodsmen and other volunteers. With the greatest care, a breastwork had been built of earth, boxes and cotton bales, and when the assault was made by the British on January 8, 1815, in less than half an hour they were overwhelmed and driven back, with a loss of 2500 men, including their leader and many other officers. The loss of the Americans was but eight killed and thirteen wounded. The battle was fought after the signing of the treaty of peace, but neither commander had been notified of this event. The victory made General Jackson the idol of the people and was one important cause of his election to the presidency.

New Philadelphia, Ohio, the county-seat of Tuscarawas co., 100 mi. s. of Cleveland, on the Tuscarawas River and the Ohio Canal and on the Baltimore & Ohio and the Pennsylvania railroads. The city is in an agricultural region, has good water power, and contains manufactories of steel, canned goods, roofing tile, woolen goods, carriages, flour and other articles. Springer's Park and Shorenbraun Springs are attractive features. The place was settled in 1805 and was incorporated three years later. Population in 1900, 6213.

New'port, Ky., a city in Campbell co., on the Ohio River opposite Cincinnati, Ohio, on the Licking River opposite Covington, Ky., and on the Chesapeake & Ohio and the Louisville & Nashville railroads. Bridges and electric railways connect the three cities. Newport is a popular residence place for Cincinnati business men. It has a city park, and the principal structures are the public library, the courthouse, the city hall, the postoffice, the Newport and German national bank buildings and the Masonic Temple. The industrial establishments include a large rolling mill, a pipe foundry, lithograph and printing works, a watch case factory, a brass foundry and other works. The city has more than a score of churches, and many streets are well paved with brick and macadam. It was settled in 1791 and was chartered as a city in 1850. Population in 1900, 28,301.

Newport, R. I., the county-seat of Newport co., 30 mi. s. of Providence, on the island of Rhode, in Narragansett Bay, and on the New York, New Haven & Hartford railroad. The city has a beautiful location and a splendid harbor, with forts Adams and Geble at the entrance. There is regular steamship connection with New York, Providence and other cities; and the beautiful scenery, equable climate and excellent facilities for bathing, boating and driving have made the place a very fashionable and exclusive summer resort. The old town has narrow streets and quaint houses near the harbor, while the modern section reaches over to the ocean side of the island and is composed of elaborate and very costly summer residences. Among the many places of interest are the bathing resorts, Eaton's Beach and Bailey's Beach; the ten mile ocean drive; Hanging Rocks; the deep rock fissure, locally known as Purgatory, and Spouting Rock, through which water is sometimes forced to a height of fifty feet. There are also several libraries, public parks, fountains, statues and monuments. The old state house; the city hall; Redwood Library; Trinity Church; a synagogue, said to be the oldest in the United States; Sayer House, which was the headquarters of the British army in 1777, and the Vernon House, which was Rochambeau's headquarters, are all of considerable interest.

The first settlement was made in 1639, and one of the first public schools in America was started here in 1640. In the latter part of the eighteenth century, the place was a great commercial center, and its trade for a time even exceeded that of New York City. During the Revolution it was occupied by British soldiers, and many of the houses were destroyed and the shipping so injured that it never recovered its former commercial position. There is now a large trade in fish, but the other industries are of only slight importance. Population in 1905, 25,039.

Newport News, Va., a city in Warwick co., 12 mi. n. e. of Norfolk and 75 mi. s. e. of Richmond, on Hampton Roads, at the mouth of the James River, and at the terminus of the Chesapeake & Ohio railroad. It has a fine harbor, is reached by several coastwise and foreign steamship lines, and conducts an extensive foreign trade. There are large shipbuilding yards, grain elevators, lumber mills, iron works and coal wharves. Electric railways run to Hampton, Old Point Comfort and other places. Casino Park, along the river in the heart of the city, is an attractive place. Newport News was settled in 1882 and was incorporated in 1896. Population in 1900, 19,635; estimated in 1903 at 25,000.

New Red Sandstone, the name of a group of rocks lying between the Carboniferous and the Middle Triassic systems. The formations are loams, shales and sandstones, all of which are usually of a reddish color. The name was given this group to distinguish it from the Old Red Sandstone group of Europe. See Carboniferous System; Triassic System.

New Rochelle, *ro shel'*, N. Y., a city in Westchester co., 16 mi. from the Grand Central station, New York City, on an arm of Long Island Sound and on the New York, New Haven & Hartford railroad. It is a residence suburb and has some large colonial mansions, remaining from the Dutch and English periods. The old Leland Castle, which was known for its fine interior decorations, is now occupied by the Ursuline Seminary. The city has a well-kept park, a public library and a hospital. Other prominent structures are the Saint Gabriel's Church, the Masonic Temple and the Knights of Columbus building. A monument has been erected to the memory of Thomas Paine, who had his home here for several years. The place was settled in 1867 by Huguenots, some of whom were natives of La Rochelle, France. Population in 1905, 20,480.

New Sibe'ria Islands, a group of islands in the Arctic Ocean, n. of Siberia. The largest of the islands are Kotelnoi, New Siberia and Liakhov. The total area of the group is 9650 square miles. The bones of numerous extinct animals have been found in these islands, fossil remains of the mammoth having attracted most attention. The islands are uninhabited.

New South Wales, a state of the Commonwealth of Australia, bounded on the n. by Queensland, on the e. by the Pacific Ocean, on the s. by Victoria and on the w. by South Australia. Its area is 310,700 sq. mi. Near the coast, in an irregular chain, runs the range of mountains which is known as the Great Dividing Range. This chain is called in the northern part of New South Wales the New England Range; in the center, the Blue Mountains, and in the south, the Australian Alps. The Blue Mountains, especially, are very rugged and much broken up by canyons and gorges. To the east of these mountains is a generally fertile strip, which is watered by a number of short, rapid rivers. West of the mountains is a great plateau, which at places is of a semi-desert character. The chief rivers of New South Wales, besides the Murray, which forms the southern boundary, are the Darling, the Murrumbidgee and the tributary of the latter, the Lachlan. There are numerous other rivers in the territory west of the mountains, but most of them are dried up during the dry season.

On the whole, the climate of New South Wales is healthful and not extreme. In the north, however, it is well-nigh tropical, and at places on the interior plains the temperature rises at times to 130°. The temperature of the coast is much lower. The average rainfall on the coast is about 50 inches, while in the interior it is generally less than 20 inches and in places only 10 inches.

The mineral resources of New South Wales are plentiful. Coal fields extend over an immense area, and the total production of the coal mines in 1901 was almost 6,000,000 tons. Copper ore of the richest quality has been found in great abundance, but this has not yet been extensively worked. Tin exists in large quantities, and iron is very generally distributed. Gold was discovered in 1851, and the total output of gold from that date to the present has been greater than that of any other metal. Of late years, however, the annual output of silver has been greater than that of gold.

The scarcity of water renders much of the surface far better adapted for pasturage than for agricultural purposes, though where the necessary moisture is present, heavy crops are raised. The chief products are wheat, maize, oats, barley, potatoes, hay and sugar cane, and vines and fruits of various kinds are also produced. The raising of sheep and cattle, however, is the chief employment of the people, and wool is the most important article of export. In 1901 there were over 40,000,000 sheep in New South Wales. Meats, leather, hides and tallow, as well as live stock, are exported. The manufacturing industries of the colony are not of great importance as yet, but they are growing steadily, and they include tanneries, woolen factories, soap and candle works, breweries, shipyards, foundries, machine shops and clothing factories. There are about 3000 miles of railway in operation, and there is an efficient telegraph system.

The constitution of New South Wales provides for a governor, a responsible ministry and a parliament of two houses, consisting of a legislative council, appointed by the king of England, and an assembly, elected by the citizens of the state. The Church of England has the largest membership of any one Church, and the Roman Catholic Church comes second. No aid is given to the Church by the State. Primary education is compulsory, but a small fee is charged those students who are able to pay. At the head of the educational system is the University of Sydney, and there are colleges, secondary schools and evening schools.

New South Wales was visited by Cook in 1770 and was settled in 1788 as a penal colony. This character it retained to 1839. The most important events in its history since that date have been the establishment of representative institutions; the erection of Victoria into a separate colony in 1850; the separation of Queensland in 1859, and the discovery of gold in 1851 and the consequent increase in population and prosperity. New South Wales became one of the states of the Australian commonwealth in 1901. See AUSTRALIA; AUSTRALIA, COMMONWEALTH OF.

News'paper, one or more sheets of paper printed, folded together and distributed at regular intervals for conveying the news and other intelligence. The first attempt to circulate news by writing was made by the Romans. The generals of the imperial armies sent messages called *acta diurna* (daily doings) to the various officers under their command. Some centuries later a news sheet known as the *Gazetta* orginated in Venice. It is from this that we get the name *Gazette*, so frequently applied to newspapers (See GAZETTE). The Chinese published the *King Pao* early in the eighth century, and this is the first printed newspaper known.

HISTORY. The first attempt to make a newspaper of the modern type was in the publication of the Frankfort *Journal* in 1615. The first English paper was the *Weekly News*, started in 1622. The first English daily was published in 1702, and the penny paper was established in England in 1709. The first newspaper of France appeared in 1631, and the first Russian paper in 1703, under the authority of Peter the Great.

The first newspaper in America was *Publick Occurrences*, issued in 1690, in Massachusetts, but it incurred the displeasure of the government and was immediately suppressed. The Boston *News Letter*, begun in 1704, is therefore regarded as the first American newspaper. This was followed in 1719 by the Boston *Gazette*. The *American Weekly Mercury* of Philadelphia was the first paper published outside of Boston. The New York *Gazette* appeared in 1725, and at the beginning of the Revolution there were thirty-seven papers in the colonies, all but four of which supported the American cause. The first daily was the *Advertiser* of Philadelphia, issued in 1784. This was followed the next year by the *Advertiser* of New York. The first penny paper in the United States appeared in New York in 1833. In 1830 American newspapers received a great impetus, and from that time to the present they have increased in number and strength.

MAKING A NEWSPAPER. The first newspapers were small affairs and were often printed on poor paper; the sheets were no larger than a half-sheet of foolscap, and these were frequently printed on but one side. The proprietor was then editor, compositor and printer; many weekly journals in small towns are still managed in much the same way. Small city dailies and the better class of weeklies usually have two or more editors, in addition to a few reporters and a force of compositors and printers.

The large city daily has its force thoroughly organized under the following departments: editorial, news, advertising, circulation and printing. The *editorial* department of a large daily is in charge of the editor in chief, who determines the policy of the paper and decides what public issues shall be given most prominence. Under him are the department editors, each of whom has his staff of correspondents and reporters and is responsible for his department in the journal. The city editor looks after local news. The editor of the foreign department gathers news from foreign countries and often discusses the political situations abroad. The political and financial questions always occupy a prominent place, and these departments are in charge of able editors, who write the leaders for the editorial columns.

News for all departments is gathered by reporters and correspondents, each of whom is under the direction of one of the department editors. Local items are prepared for the paper by the reporters, but news from distant cities and foreign countries sent by telegraph goes to the telegraph editor, who directs its preparation for the paper (See ASSOCIATED PRESS). The matter for each department is finally submitted to the editor of that department, who selects enough to fill the space at his disposal.

When the matter leaves the editor, it goes to the composing room, where it is placed in type by linotype machines (See LINOTYPE). From the composing room, the type goes to the foundry, where the stereotype plates are made for the press (See STEREOTYPING). Web perfecting presses, which print both sides of the sheet at once, are used, and the paper is fed to the press from the roll or web (See PRINTING PRESS). The press prints, cuts and folds the papers ready for the mails or for city distribution. Some of these presses can print and fold 150,000 twelve-page papers per hour, printing, when desired, in twelve different colors.

The advertising and circulation departments are connected with the financial phase of the enterprise. The advertising manager solicits advertisements and sees that they are properly placed in the paper. The manager of circulation uses his efforts in extending the list of readers for his journal. These departments are of great importance, since the paper depends upon them for its financial support.

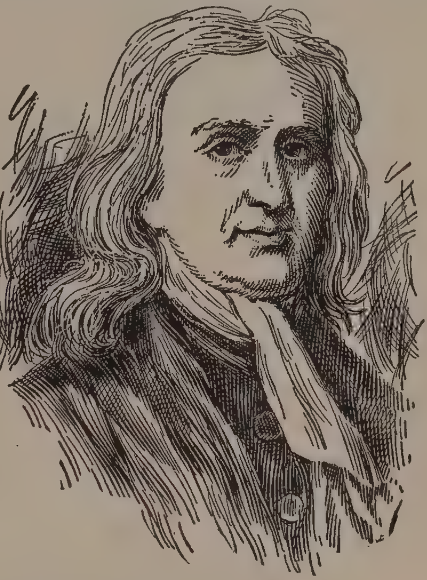
Most of the work on a morning paper is done at night and has to be done rapidly. Long articles that come in late are cut into numerous sections, the sections are numbered and given to compositors, so that the entire article is placed in type in a few minutes. Illustrations are made form pen-and-ink drawings and from photographs by zinc etching and halftoning and can be prepared on short notice (See HALFTONE; ZINC ETCHING). There are about 60,000 papers in the world. Of this number the United States has over 22,000, a far larger number than any other country. Of these, about 16,400 are weekly and 2400 daily. The United States is followed by Great Britain, with 9500; Germany, with 8050, and France, with 6700. There are no other countries which have 3000 papers.

Newt, the popular name applied to various genera of animals, belonging to the amphibians, that live both on land and in water. *Water newts*, or water salamanders, as they are sometimes called, have a flattened tail for swimming. When they are full-grown the gills are cast off, but the tail is retained throughout life. The males are distinguished by a crest, or fleshy ridge, on the back. The food consists chiefly of water insects and larvae. Of the Old World species the *crested newt* is one of the best-known. It is about six inches in length and is common in fresh water pools and ponds in Great Britain. The *marbled newt* is also well known. Of the American species the *red spotted newt*, common in the eastern United States, is the most familiar. It is of a greenish color, with red dots on the sides, and is four inches long. The land newts are included in the genus of salamanders. See SALAMANDER.

New'ton, KAN., the county-seat of Harvey co., 200 mi. s. w. of Kansas City, on the Missouri Pacific and the Atchison, Topeka & Santa Fé railroads. The city has an extensive trade with the surrounding agricultural and stock-raising district and contains flour mills, creameries, a grain drill factory, a large ice plant and stockyards. Bethel College is located here, and the city has a public library, three banks and about seventeen churches. It was settled in 1871. Population in 1905, 6601.

Newton, MASS., a city in Middlesex co., adjoining Boston, on the Charles River and the Boston & Albany railroad. It is a beautiful residence place and has about 160 acres of city parks and a large reservation of 118 acres belonging to the Metropolitan Park district. The Newton Theological Institution, Lasell Seminary for women and Allen School for boys are located here. There is a large public library, and the other prominent buildings include the First Baptist and Eliot churches and the high school. A memorial to John Eliot has been erected near the site of Waban's Wigwam, where he began to preach to the indians. The river furnishes water power, and the city has manufactures of machinery, electrical apparatus, silk, rubber, paper, shoes and other articles. The place was settled in 1631, but remained a part of Cambridge until 1688, when it was incorporated as New Cambridge. It was given the present name in 1692 and was chartered as a city in 1873. The city now has within its limits fifteen villages. Population in 1905, 36,827.

Newton, ISAAC, Sir (1642–1727), the most distinguished of natural philosophers, equally famous as a mathematician and astronomer, born in a little village in Lincolnshire, England. He was sent at an early age to the village school, and in his twelfth year he went to the town of Grantham, where he remained till he was entered at Trinity College in 1660. In 1665 he took his master's degree at Trinity College and a few years later was made professor there. His



SIR ISAAC NEWTON

interests were not wholly confined to studies, for he was a member of Parliament and took an active part in public affairs. In his fifty-fifth year he was appointed warden of the mint. He was for years a member of the Royal Society and in 1703 was elected president, a position which he held until his death. He was buried in Westminster Abbey, where ten years later a beautiful monument was erected to his memory.

In addition to his services to his country in Parliament and elsewhere, he made some of the greatest discoveries of the age. In physics he discovered the law of gravitation, and though he was not wholly right in his propositions, he added a great deal to the knowledge of light and color. In algebra he discovered the binomial theorem. In astronomy he invented a refracting telescope and applied the laws of gravitation to the heavenly bodies. All of his work on light and color is collected in a book under the title *Optics.* His greatest work was the *Principia,* in which he laid the foundation of modern physics and mathematics.

New Ulm, MINN., the county-seat of Brown co., 26 mi. n. w. of Mankato, on the Minnesota River and on the Chicago & Northwestern and the Minneapolis & Saint Louis railroads. The city has a considerable trade with the surrounding rich agricultural and stock-raising district. It contains grain elevators, flour mills, breweries, cigar factories, brickyards, creameries, machine shops, potteries and various other works. There are the high school and Turnverein libraries, a fine courthouse, Saint Alexander Hospital, five churches, Saint Michael's Academy and the Doctor Martin Luther College. The place was settled by a German land company in 1857, was incorporated in 1870 and was chartered as a city in 1876. The inhabitants are chiefly of German descent. Population in 1905, 5720.

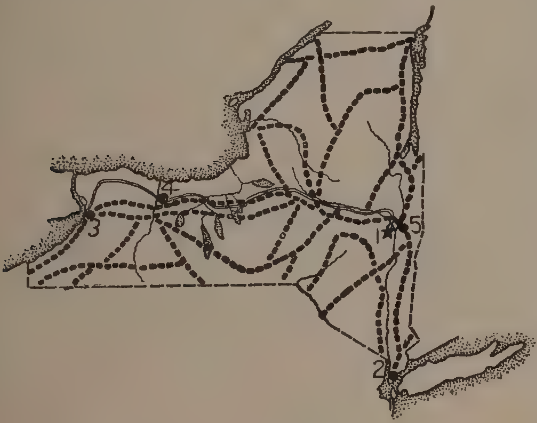
New West'minster, a city of Canada, the former capital of British Columbia, on the Frazer River and the Canadian Pacific and other railroads. The surrounding country is agricultural. The most important industry of the town is the salmon fishing and the canning of salmon and other fish. The trade is large in lumber and furs, and there are machine shops, carriage works and foundries. Population in 1901, 6499.

New Whatcom, *whaht'kom.* See BELLINGHAM.

New Year's Day, the first day of the year, celebrated from the earliest times by various nations by some sort of festival. Of course, among the ancient nations the time set as the beginning of the year differed, but all treated it with some special observance. In the early church any celebration of the day was at first forbidden, but later the day was made a Christian festival. Previous to the sixteenth century, even in Christian countries, different days were recognized as the beginning of the year, and it was not until 1752 that January 1 was declared by the Parliament of Great Britain as the opening day of the year for that country. In most countries where celebrations have been held on New Year's Day, these have consisted largely in feasting and the interchange of presents, and the custom of keeping watch on New Year's Eve and ushering in the new year with mutual good wishes has been in vogue since ancient times. The "ringing in" of the new year by bells tolled at midnight, and the interchange of visits on New Year's Day are old customs.

New York, the EMPIRE STATE, one of the North Atlantic states, is bounded on the n. by the Province of Quebec; on the e. by Vermont, Massachusetts and Connecticut; on the s. by New Jersey and Pennsylvania; on the w. by Pennsylvania and the Province of Ontario, and on the n. w. by the Province of Ontario, from a portion of which it is separated by the Saint Lawrence River. The Niagara River also forms the western boundary, and the deepest channel in Lake Champlain forms a portion of the eastern boundary. Owing to the fixing of the boundary line between the United States and Canada along the deepest channel of the Great Lakes, about one-third of Lake Ontario and a little more than one-third of that portion of Lake Erie bordering upon the state belong to New York. The extreme length of the state from north to south is 312 mi. and from east to west, 326 mi. The area is 49,170 sq. mi., of which 1550 sq. mi. are water. This area, however, does not include the portions of Lake Ontario and Lake Erie adjoining New York. Population in 1905, 8,067,308.

SURFACE AND DRAINAGE. New York has a great diversity of surface, but it is easily divided into six physical regions, including Long Island. The first is the Adirondack region, which occupies all of the northern and eastern portions of the state, including several counties. This section is characterized by the ranges and groups of mountains belonging to the Adirondacks. They rise abruptly, beginning a short distance west of Lake Champlain, and contain numerous ranges that run approximately northeast and southwest. These are comparatively low mountains, Mount Marcy, the highest peak, attaining an elevation of only 5344 feet. The slopes of these mountains are steep, and the intervening valleys are strewn with boulders. Their sides are heavily timbered with pine, spruce and other woods, and the valleys contain numerous lakes. Vast tracts of this region are still wild forests. A large state park has been created in the heart of these mountains, in order that the forests may be preserved (See ADIRONDACK MOUNTAINS). To the south, these mountains slope to the Mohawk valley, and to the southwest they descend to the lake shore plain, which borders Lake Ontario.



NEW YORK

1, Albany; 2, New York; 3, Buffalo; 4, Rochester; 5, Troy. Dotted lines indicate chief railroads.

The second mountain region occupies a narrow belt in the southeastern border of the state, extending north to about the head of Lake Champlain. This contains an extension of the Appalachian Mountains, which cross New Jersey and the border of the Hoosac range, forming the boundary between Massachusetts and New York. It slopes gradually towards the Hudson River and is a well-watered and fertile region, not very abrupt and easily cultivated.

West of this and south of the Mohawk valley is the Catskill region, which is a somewhat broad plateau, upon which rise the Catskill Mountains. These are in the form of a group, rather than a range, and their highest peak, Slide Mountain, has an altitude of 4205 feet; a few other peaks reach about 3000 feet. Many of their slopes are wooded, the intervening valleys are fertile and this region, like that of the Adirondacks, is a favorite summer resort.

Extending westward from the Catskill region and covering that portion of the state between the southern boundary and the lake shore plain and Mohawk valley is the great plateau region. The southern part of this is quite broken, and along the Pennsylvania line, in the south central part of the state, the counties contain numerous high hills and deep valleys. The highest part of this plateau is in Otsego County, a little east of the center of the state. Here the Delaware and the Susquehanna rivers have their sources. The northern part of this plateau consists of slightly rolling country, dotted here and there by patches of woodland, but mostly under a high state of cultivation.

To the north of this is the lake shore plain, which rises gradually from Lake Ontario in two terraces, the first of which was the former shore of the lake and is from 5 to 10 miles inland, while the second is about 30 miles inland. This plain is divided near its western extremity into two sections by a formation of hard limestone, forming the cliff over which the cataract of Niagara plunges into the gorge of Niagara River, and it is also over this terrace that the Erie Canal descends at Lockport. The surface of this region is slightly undulating, with a gentle slope towards the lake. Extending from the southeast point of Lake Ontario to the Hudson River in the vicinity of Albany is the low, narrow valley of the Mohawk River, characterized by its nearly level slope. This afforded the natural route for the construction of the Erie Canal, to which New York owes so much of its industrial prosperity. Long Island is a part of the coastal plain and is low and nearly level.

The drainage of New York is nearly as complex as its surface. With the exception of the northeastern counties, the eastern part of the state is drained through the Hudson River, which is the most important stream wholly within the state. Its chief tributary, the Mohawk, waters the central portion of the state, and south of that are found the Catskill and the Shawangunk. The northeastern portion of the state is drained through Lake Champlain into the Saint Lawrence; the northwestern counties are drained directly into this stream, while the lake shore plain contains a few short rivers flowing into lakes Ontario and Erie. The Delaware and the Susquehanna have their sources a little east of the center, but do not receive any important tributaries from New York. The extreme southwestern part of the state is drained through the Allegheny River into the Ohio, and thence to the Mississippi. Many of the streams contain deep gorges and beautiful waterfalls. Chief among the latter are Niagara Falls (See NIAGARA FALLS AND RIVER); Glens Falls; the falls of the Genesee River; Taughannock Falls, near Cayuga Lake, the highest in the state, having a fall of 230 feet, and the falls of the Mohawk, where it enters the Hudson, near Cohoes.

New York contains a large number of lakes, either wholly or partly within its boundaries. These are located chiefly in the Adirondack region, in the region just to the south of it and in the central part of the state. Worthy of note in the eastern part of the state is Lake George, which is described under its title. In the plateau region, directly south of Lake Ontario, is a group of long, narrow lakes, nearly parallel to each other, with their greatest length extending north and south. Because of their form and relative position, they are known as the Finger Lakes. The most important of these are Cayuga, Seneca and Canandaigua. To the northeast of these is Lake Oneida, while in the southwestern county is Chautauqua Lake, noted for its beauty and as a summer resort.

CLIMATE. The climate of New York is varied, with a range wider than that of any other of the Atlantic states. Those portions which are under the influence of ocean, sound and lake winds are more even in temperature. Other regions suffer severely from the early frosts of autumn and the late frosts of spring, from extremes of heat in summer and of cold in winter. In the Adirondack region the summer is delightful, but the winters are long and severe, with heavy snows. The mean annual temperature of the state is 47°; the average annual rainfall, including snow, is about 41 inches.

MINERAL RESOURCES. The Adirondack region contains extensive deposits of iron ore, which have been worked for many years, but since the opening of the ore beds along Lake Superior these mines have lost their former importance. Along the Hudson and in other parts of the state there are extensive quarries of limestone, suitable both for building purposes and for the manufacture of Portland cement. Marble and granite are also found, the latter in large quantities, and along the Hudson there are large beds of brick clay. In the vicinity of Syracuse there are extensive deposits of rock salt, which make New York the leading state in the production of salt. Natural gas and petroleum are found in the southwestern section. The annual output of petroleum averages about 1,163,000 barrels. Gypsum, lead, graphite and sandstone are also found in large quantities.

AGRICULTURE. More than half of the state is under cultivation, and New York is one of the most important agricultural states. The rainfall is abundant, and the climate is well suited to all products that can be raised in a medium temperate climate. In general, the farms are small and under a high state of cultivation. The variety of surface, the means of transportation and the variations in climate give the agriculture of the state a wide diversity of interests. The counties along the lower part of the Hudson are favorably situated for market gardens and for producing dairy articles for the city; hence, the farms in this region are largely devoted to these industries. Through the plateau regions, the soil and climate are better suited to the growing of cereals and fruits, and here large quantities of potatoes, corn, oats, beans, apples, peaches and plums are raised. In the northwestern part of the state, which includes the western slope of the Adirondack region and the eastern portion of the lake shore plain, the farmers are chiefly engaged in dairying, producing butter and cheese in large quantities. This industry also extends quite generally across the central part of the state. In the central counties hops are extensively raised. The raising of live stock is confined very generally to dairy cows and other cattle, while horses, sheep and swine are found in sufficient numbers to supply local demand.

MANUFACTURES. New York is the leading state in the Union in manufactures, both in extent and variety of her products. The manufacturing industries include almost everything that is made. Though chiefly centering around New York City and Buffalo, they are widely distributed through other parts of the state. The forest regions of the Adirondacks and Catskills give rise to the manufacture of considerable lumber in these localities. Some lumber is also produced in the south central counties. Along the Hudson are the largest brick works in the world, and the clay products of the state exceed $8,000,000 a year in value. Of the factory products the manufacture of clothing takes first rank. This is followed by the manufacture of cotton and woolen goods and other textiles. The production of foundry and machine shop products is also very large, including the manufacture of many small machines, such as sewing machines, knitting machines and typewriters. Troy is the great center of the United States for the manufacture of collars, cuffs and shirts, while Rochester leads in the prodution of optical instruments and cameras. The great water power developed at Niagara Falls (See NIAGARA FALLS AND RIVER) has fostered numerous industries in this part of the state, some of which are found nowhere else in the country. Among these are the plants for the production of aluminum, nearly the whole output of which is made here. Next to New York, Buffalo is the greatest manufacturing center, and among its leading industries are found the production of flour and grist mill products. See BUFFALO; NEW YORK (City).

TRANSPORTATION AND COMMERCE. The entire state is amply supplied with railways and navigable streams and canals. The New York Central & Hudson River railway, with all of the lines under its control, extends from New York City northward to Albany, then westward to Buffalo. This system contains numerous other lines, running either parallel to its main line or acting as feeders for it. Besides these are the Erie, the Lehigh Valley, the New York, Ontario & Western and numerous other important trunk lines. The Erie Canal, connecting Lake Erie, at Buffalo, with the Hudson, at Albany, is one of the most important canals in the world (See ERIE CANAL). The Hudson is navigable as far as Albany, and there are important ports on Lake Ontario, so that the state has water communication extending from the Atlantic through the Great Lakes to the interior of the country.

In commerce New York surpasses all other states. Over one-third of the exports and nearly two-thirds of the imports of the United States pass through the port of New York City. Besides this, much of the domestic traffic between the East and West passes through the state. In addition to this carrying trade, the great diversity of industries within the state itself, combined with her large population, makes her domestic commerce larger than that of any other section of the United States of the same area.

GOVERNMENT. The legislature consists of a senate of 50 members, chosen for two years, and a house of representatives of 150 members, chosen annually. The membership of both houses is apportioned by districts according to population, but county lines are not broken in forming these districts. The executive department consists of a governor, a lieutenant governor, a secretary of state, a comptroller, a treasurer, an attorney-general and a state engineer and surveyor, elected for two years. The other officers, as well as administrative boards having charge of charities, health and railroads, are appointed by the governor and confirmed by the senate. The state courts consist of the court of appeals, which is the highest court and is composed of a chief justice and six associates, elected for fourteen years; a supreme court, composed of 76 judges, each elected for fourteen years; county courts; surrogate courts, and city courts. The state is divided into eight judicial districts, in which sections of the supreme court sit. Cities and towns manage their own local judicial affairs through courts which they establish under acts of legislature. Because of the large number of cities within the state, they have been divided by the legislature into three classes, the first class including those of 250,000 or more inhabitants, the second including those between 50,000 and 250,000 inhabitants, and the third, those below 50,000 inhabitants. Each class is allowed to organize its government according to general plans established by the legislature.

EDUCATION. The state maintains a well-organized and highly efficient system of public schools. These are under direct control of the state board of regents, consisting of 11 members elected by the legislature and known as the University of the State of New York. The executive officer of this is the commissioner of education, who has general charge of the system of public instruction (See NEW YORK, STATE UNIVERSITY OF). Fifteen normal schools and one normal college are maintained by the state. There is no state university, and the state agricultural college and experiment station are connected with Cornell University at Ithaca. The most important higher institutions of learning, not under control of the state, are Columbia University at New York, New York University, Cornell University, Syracuse University, the College of the City of New York, Vassar College at Poughkeepsie, Saint Francis Xavier and Saint John's colleges in New York City, and a large number of medical, technical and theological institutes located throughout the state.

INSTITUTIONS. The state maintains over 500 charitable and penal institutions which are under the supervision of boards of charities, correction and lunacy. The asylum for feeble-minded children is at Syracuse, and that for feeble-minded women is at Newark. The school for the blind is at Batavia, and that for crippled and deformed children at Tarrytown. The hospitals for the insane are at Willard, Binghamton, Buffalo, Flatbush, King's Park, Dannemora, Gowanda, Mattewan, Middletown, Ogdensburg, Poughkeepsie, Rochester, Utica and Ward's Island. The penal institutions include the prisons at Ossining (Sing Sing), Auburn and Clinton, the reformatories at Elmira and Napanock and the reformatory for women at Bedford. Penitentiaries for the confinement of offenders who receive short sentences are county institutions and are located in New York, Kings, Erie, Monroe, Clinton and Albany counties. There are also a number of reform schools and industrial institutions for juvenile offenders and a house of refuge for women.

CITIES. New York contains a larger number of cities than any other state. The most important of these are Albany, the capital; New York, including Brooklyn; Buffalo, Rochester, Syracuse, Troy, Utica, Yonkers, Binghamton, Elmira, Schenectady, Auburn, Newburgh, Kingston, Poughkeepsie and Cohoes, each of which is described under its title.

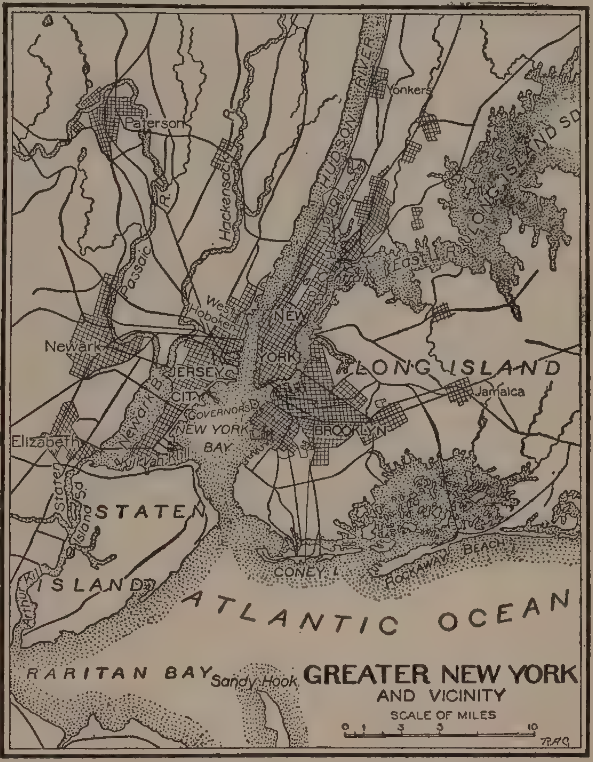
HISTORY. In 1609 the Frenchman Champlain and the Englishman Hudson, who was in the employ of the Dutch, both entered the territory of New York, the former descending from Canada by way of Lake Champlain, the latter ascending the Hudson River. Owing to their alliance with the Iroquois indians, the Dutch were the first to establish prosperous settlements, and they maintained a profitable fur trade for years. In 1624 Albany was settled, and two years later New Amsterdam (now New York) was founded. The Dutch came into constant collision with the English on the east and the Swedes and English on the south, and finally were forced to relinguish their hold on the territory in 1664, when New York, New Jersey and Delaware were all conquered by England and granted to the duke of York. For a time the colony prospered under liberal rule, but it was later made the victim of worthless and unscrupulous governors. It suffered severely by the invasions of French and indians in the wars of the eighteenth century. In the early days of the pre-Revolutionary struggle the colony was about evenly divided between Tories and patriots, but the latter gradually gained the upper hand, and some of the most defiant actions of the whole struggle were taken by New York. An independent government was organized in 1775, and a constitution was adopted in 1776.

New York was among the first to ratify the Articles of Confederation (1778), but it opposed a strong Federal government, two of its three delegates withdrawing from the constitutional convention. It was the eleventh state to ratify the Constitution (July, 1788). The Federalists were at first dominant in the state, but after 1800 for more than twenty years the Anti-Federalists were in power, chiefly under the leadership of De Witt Clinton. The Erie Canal was constructed between 1817 and 1825. Though a free state, New York was divided in the slavery struggle, and during the early years of the war the Democrats, or anti-administration party, were in power. The state furnished 467,000 troops to the Federal army. Since the war the state has rapidly grown in wealth and population, being aptly called the "Empire State." It has been doubtful in politics for man years. Consult Roberts's *New York*, in the American Commonwealths Series.

New York, the largest city of the western hemisphere and, next to London, the largest in the world. It is located in the State of New York, at the mouth of the Hudson River, which enters the Atlantic Ocean through New York Bay. It occupies a location naturally fitted for a great city, and it has one of the finest harbors in the world. A great bay 6 miles long and 5 miles wide enters from the ocean through the Narrows, a strait guarded by forts Hamilton and Wadsworth. New York proper is located on Manhattan Island, which is about 13 miles long, with an average width of a little less than 2 miles. Except at the south end, the island is solid gneiss and limestone, a fact that has made tunneling and other operations exceedingly difficult. The surface, too, is hilly, and the leveling of streets and the cutting down of squares has been enormously expensive. The Hudson River, a broad, magnificent, navigable stream, flows along the west side of the island. Its eastern shore is made by Spuyten Duyvil Creek and by two rivers, the Harlem, which leaves the Hudson at the north and flows southeast, and East River, which is practically a continuation of Long Island Sound into New York Bay. As the East River and the Sound are both navigable for large craft, it makes the facilities for commerce unrivaled. On Long Island, across from the lower end of Manhattan Island, was the city of Brooklyn, and across the Hudson, in New Jersey, are Jersey City and Hoboken, which, though not included in Greater New York, are yet to all intents and purposes a part of it.

Greater New York, as established by charter in 1897, consists of five boroughs, of which the chief is Manhattan; the others are Brooklyn, Queens, Richmond and the Bronx. The borough of Brooklyn is coexistent with King's County, on Long Island (See Brooklyn). The borough of Queens extends north and east of Brooklyn on Long Island and is noted for its great manufacturing establishments, especially in Long Island City. The Bronx, north of Manhattan, and Richmond, south of the Bay, are mainly residence districts. The total area of the city is 309 square miles.

New York is 232 miles southwest of Boston; 226 miles northeast of Washington; 911 miles east of Chicago, and about 2700 miles east of San Francisco. There are numerous railroads connecting New York with other cities in the United States; ships from all parts of the world enter her harbor; submarine cables, wireless telegraph stations and ordinary telegraph and telephone connections place her in communication with all the cities of the country. The principal railways are the Erie; the New York Central & Hudson River; the Pennsylvania; the West Shore; the Baltimore & Ohio, and the New York, New Haven & Hartford. The New York Central and the New York, New Haven & Hartford have a great terminal station near 42nd Street, on Manhattan Island. The other lines terminate on the west bank of the Hudson and transfer passengers and freight by ferries. One of the great engineering and building feats of the century is the tunneling of the Hudson River and the construction of a splendid terminal depot on Manhattan Island by the Pennsylvania railway. New York has electric railways running the length of the Island on several of her principal streets, abundant cross-town lines and a very complete system of elevated railway lines, which run from the south end of the island into the Bronx. Besides these, there are splendid subway lines leading north into the Bronx from the lower end of the island. To construct these lines was a tremendous undertaking, as it involved tunneling through solid rock for many miles. Innumerable ferries cross the Hudson and the East River. Tunnels under these rivers also connect Hoboken, N. J., with Bronx and Brooklyn, carrying throngs of people into the city in the morning and returning them at night. The East River is spanned by two wonderful bridges, the Brooklyn Bridge and the new Williamsburg Bridge, both suspension bridges fixed so high above the river as not to impede navigation (See Bridge, subhead *Suspension Bridges*). The Harlem River is also crossed by splendid bridges, among which is High Bridge, which carries the old Croton Aqueduct.



Streets, Parks and Monuments. The business center of New York is the southern end of the island, the oldest part of the city. Here the streets are narrow and crooked, having come into existence without definite plan. North of 14th Street, however, the city is laid out with regularity. The principal street running north and south is Broadway, which extends from the lower end of the island, changing its direction frequently, far to the north, and, in fact, is continued under the same name many miles beyond the limits of Greater New York. Near the southern end of Broadway are the largest banks and the great commercial houses, while to the north is the retail district and still farther north, the homes of the well-to-do. The East Side of New York is the tenement district, and on the west, along the Hudson, are manufacturing plants and large wholesale houses. The avenues, which become parallel after leaving 14th Street, run north and south and are numbered from east to west. All, however, converge at the south end of the island. On Second, Third, Sixth and Ninth avenues are the elevated railways, which also converge at the Battery. The cross-town streets at the lower end of the island run in different directions and are named without regard to plan, but at Houston Street, on the East Side, the cross-town streets run east and west and are numbered toward the north. From 13th Street north, they cross the island in parallel lines. The whole lower half of the island on both sides is practically lined with docks, which are connnected with the street railways and the great trunk lines. Fifth Avenue was once the fashionable residence street, and it still is so, north of 50th Street, but the lower end is now given over to fine retail stores, hotels and business houses. Wall Street is a short, narrow street that runs from Trinity Church, on Broadway, to the East River. The subtreasury and many of the banking houses are located on it.

Small squares or parks serve as breathing places in the densely crowded city. Washington Square, Union Square and Madison Square are the most noted of these. All are surrounded by fine buildings, and each has its own peculiarities. At the south end of the island is Battery Park, in which, on the site of the old Castle Garden, is located the Aquarium (See Castle Garden). Riverside Park is a strip of land running along the Hudson River from 72nd Street to 129th. Near the upper end of it is the tomb of General Grant. Riverside Drive is a beautiful boulevard, extending the whole length of the Park. Millions of dollars have been spent in the construction of other drives and boulevards, of which the Harlem Speedway, extending for two miles along the western bank of the Harlem River, from 155th Street north, has been among the most expensive. A handsome viaduct now connects the Riverside Drive with the Heights to the north of its terminus. Central Park is the greatest park in New York, and is one of the finest in the world. It is a rectangle lying between Fifth and Eighth avenues and 59th and 110th streets. The northern half of the park has been left almost in a state of nature, and nothing could be more beautiful, for it is hilly and heavily wooded, abounding in high rocky ledges that make the natural scenery picturesque. Near the center of the park are the Croton Reservoirs, which contain the water supply of the city; south of these are artificial lakes, beautiful drives, conservatories and statuary. Nature has been aided by landscape gardeners, until the whole tract is exceedingly beautiful. It is visited by thousands of people who go there every day. In the borough of the Bronx are Bronx Park, Van Cortland Park and other tracts, great portions of which are still entirely in a state of nature. In the Bronx Park are the zoölogical gardens and the botanical collection, which are visited daily by thousands of people, who find their way out of the city over elevated and surface railways. Van Cortland Park was once the estate of the Van Cortland family, and their old manor house is still preserved as one of the attractions. Golf links, ball grounds and polo grounds afford opportunities for summer games, while on the lake the skaters are cared for in the winter.

New York's most impressive monument is the bronze statue of *Liberty Enlightening the World*, on Bedloe's Island in the harbor (See Liberty, Statue of). In Washington Square is the marble Washington Arch, completed in 1892. This is 70 feet high and was erected by popular subscription at a cost of $128,000. In Central Park is a granite obelisk, which was brought to this country from Egypt. This obelisk was hewn and inscribed by Thothmes III, although one of its sides is also inscribed with the victories of Rameses II, a king who lived three centuries afterward. The obelisk was presented to the city of New York by Ismail Pasha and was brought to this country at the expense of William H. Vanderbilt. There are a number of beautiful statues and fine figures in marble and bronze in different parts of the city, especially in Central Park and the public squares. Among these are a granite statue of Alexander Hamilton; a bronze statue of Shakespeare by J. Q. A. Ward, in Central Park; a noble equestrian statue of General Sherman by Saint Gaudens, on the Plaza at Fifth Avenue and 59th Street; a bronze figure of Peter Cooper by Saint Gaudens, south of Cooper Union; a bronze statue of Lafayette by Bartholdi, in Union Square, and the colossal figure of Washington by Ward, at the subtreasury in Wall Street. The tomb of General Grant is a marble temple at the north end of Riverside Park, and from its location it is one of the most conspicuous objects in the northern part of the city.

Buildings and Institutions. The public buildings of New York are very fine, quite in keeping with the size and importance of the city. The postoffice, in City Hall Park, is one of the finest of the older buildings. Back of it, and near it, are the county courthouse and the hall of records, both new buildings. The subtreasury, in Wall Street, is one of the fine United States government buildings, but the new customhouse at the foot of Broadway, on the original site of Fort Amsterdam, costing $10,000,000, is perhaps the finest. In a small park at 42nd Street is the new public library building, and about midway up the east side of Central Park is the Metropolitan Museum of Art, a fine building in which are housed some of the best collections in the country. Original paintings and statuary, together with reproductions of the famous pieces of foreign lands, make the museum a favorite resort of artists. The collections of jewels and porcelain and miscellaneous objects of art are extensive and exceedingly valuable. The museum is open to the public daily during certain hours. On the west side of the Park at 77th Street is the Museum of Natural History, a magnificent building in which is one of the finest collections in natural history to be found in the New World. The most noted church of New York is probably the old Trinity Church, located at the head of Wall Street. In the churchyard are buried some of the famous personages of early times. Grace Church, on Broadway; Saint George's, with its lofty spires, on Stuyvesant Square, and the Roman Catholic Saint Patrick's cathedral, on Fifth Avenue, are all interesting churches. The last is the finest Gothic edifice in this country. It is built of white marble, in the form of a Latin cross, and it has two beautiful spires rising to a height of 323 feet. On a rocky bluff, overlooking Harlem plains, is the Episcopal Cathedral of Saint John the Divine, now in process of construction. It will probably not be completed for many years to come. The total cost will be in the neighborhood of $20,000,000, and in vastness of dimensions and beauty of design, the cathedral is expected to take a leading place among the great churches of the world. New York has many elegant hotels, clubs, theaters and other semi-public buildings, besides a vast number of great office buildings that equal, if they do not surpass, those of other great cities. One of the curious buildings is the "Flatiron," a twenty-story, wedge-shaped building on the triangle where Broadway and Fifth Avenue meet.

The city institutions which care for the poor, the sick and the disorderly are located on Blackwell's, Ward's and Randall's islands, in the East River, though other hospitals are to be found in various parts of the city, and patients suffering from contagious diseases are cared for in still other institutions on small islands in the Bronx. New York spends more for public education than any other city in the world. Besides its own public schools, which include numerous well-equipped high schools, there are located here Columbia University, the College of the City of New York, New York University, the College of Saint Francis Xavier, Saint John's College, Barnard College, Union Theological Seminary and the College of Physicians and Surgeons (See Columbia University; New York, College of the City of; Barnard, Frederick Augustus Porter; New York University). Free professional schools, numerous academies, schools of music and art and many historical and scientific associations afford opportunities of advancement to every one who seeks it. Many fine libraries have been established, and the consolidation of the Astor and the Lenox libraries and the Tilden trust fund in the New York public library makes one of the largest institutions of the kind in the country. Connected with the public library are numerous circulating libraries and reading rooms, and the Carnegie gift of $5,200,000 provided for the establishment of 60 branch libraries. The first of these was opened in 1903. The various universities, colleges and societies have libraries of their own.

In 1906 there were 845 regular periodicals published in New York. Of these, 56 were dailies. The oldest newspapers are the *Commercial Advertiser*, founded in 1797, and the *Evening Post*, founded in 1801. The important dailies, arranged practically according to their circulation, are the *Journal*, the *American*, the *World*, the *Telegram*, the *Globe & Commercial Advertiser*, the *Sun*, the *Herald*, the *Times*, the *Press*, the *Tribune*, the *Mail*, the *Jewish News*, the *Herold* and the *Staats-Zeitung*.

Government. The charter of New York, as revised in 1901, has incorporated in it the important provisions which had proved satisfactory in the former city of Brooklyn and other American and European cities. The chief changes in the old charter related to the establishment of the borough system and to the provisions which permit different localities to manage their own affairs. The executive power of Greater New York is vested in the mayor and the heads of the different boroughs. The mayor, who holds office two years, appoints heads of departments and commissioners, except certain officials under the control of the heads of the boroughs. He is chairman of the board of estimate and apportionment, which consists of the mayor, the comptroller, the president of the board of aldermen and the presidents of the several boroughs. He is subject to removal by the governor upon the establishment of charges against him. The president of each borough holds office for two years. He presides over the local board and exerts therein most of the powers of a mayor. He is also a member of a board of aldermen and has the same power to vote as any member of that body. The board of aldermen, consisting of 73 members, elected for two years in separate districts, is the legislative body, and passes ordinances and resolutions which the mayor has the power to veto, though by a two-thirds vote it may pass laws over his veto, unless they require the payment of money, in which case a three-fourths vote is required. The annual expenses of New York City are in the neighborhood of $200,000,000, and the city property is valued at not less than $350,000,000. The city has a bonded debt of more than $420,000,000.

Trade and Commerce. About half of the total foreign trade of the United States passes through New York, whose commerce is five times that of the next largest American port. The coast trade of New York is much more valuable than the foreign trade, and the number of vessels engaged is many times greater. The commerce of New York has been increasing steadily, but during the last quarter of a century it has not done so proportionately with other cities. In manufactures, New York surpasses the other cities of the United States by about 50 per cent. The capital invested is enormous, and the variety and value of the articles made is unequaled. Its most important industry is the manufacture of clothing. Sugar and molasses refining is second in point of value, and in the printing and publishing business New York far outranks any other city of the United States. Malt liquors, tobacco, cigars, the roasting and grinding of coffee and spices, musical instruments, paints, electrical apparatus and supplies and finely finished manufactured articles without number indicate the variety of products and industries which engage the residents.

History. The first white man known to have visited Manhattan Island was an Italian, Giovanni Verrazano, who, sailing in the French service, entered the harbor in 1524. In September, 1609, Henry Hudson, in the service of the Dutch East India Company, explored the harbor and river, and soon after the Dutch began trading with the indians. But the first serious attempt at colonization began in 1623, when a band of thirty Dutch settlers arrived. Peter Minuit, the first governor, brought with him in 1626 another company of colonists and, having bought Manhattan Island from the indians for a very small consideration, christened the town New Amsterdam. Under Minuit and his successors, Wouter Van Twiller, William Kieft and Peter Stuyvesant, the colony prospered and grew, until in 1653 it numbered about 800 souls. In that year it was incorporated as a city. In 1664 Charles II of England granted the New Netherlands to his brother, the duke of York, who took possession of the city and renamed it New York. The Dutch regained the city in 1673, but a year later they gave way to the English. In 1686 the first city charter was issued, and in 1690 the first intercolonial congress was held in New York. The first printing press was established in the city in 1696; the first free school was opened in 1703, and the first newspaper, the *Gazette*, was founded in 1725. In 1732 a stage line was established between New York and Boston, but it was not until twenty-four years later that the Philadelphia stage began running. In the early part of the summer of 1776, a large part of the American troops were quartered in the city, and on July 8 the Declaration of Independence was publicly read to the soldiers and citizens. The next day the statue of George III on Bowling Green was torn down, but in September of the same year, the British occupied the city and held it from that time until "Evacuation Day," Nov. 25, 1783. From 1785 to 1790 Congress met in New York in the old City Hall, and here Washington was inaugurated in 1789. In 1807 Fulton's steamer, the *Clermont*, began making trips between New York and Albany, and in

1812 the first steam ferry to Long Island was opened. The completion of the Erie Canal gave an impetus to the growth of the city, which since that time has increased its population at a rate never equaled by any other municipality. Two cholera epidemics, a great fire with much loss of life, a financial panic and several riots have been events which seemed serious at the time, but which never succeeded in even delaying the city's progress. For several years after the Civil War the city suffered from political fraud perpetrated by the "Tweed Ring," but in 1871 the ring was effectually broken up. During the last forty years the material prosperity of the city has steadily increased, and everything seems to indicate that it will continue permanently.

Population. In 1900 the population of Greater New York was 3,437,202. In 1905 it was 4,013,781, distributed through the boroughs as follows: Manhattan, 2,112,380; Brooklyn, 1,358,686; the Bronx, 271,630; Queens, 198,240; Richmond, 72,845. The most densely populated district is the lower East Side. Here, in 1900, there were about 736 people to the acre. More than half of this population were foreign born, mainly Jewish and Italian. Almost every nationality is represented among the foreigners, but Germans, Irish, Italians, Russians, Bohemians, Hungarians, Austrians, Poles and English are the most numerous.

New York, College of the City of, an educational institution supported by the city of New York. The college was established by the board of education in 1847, under the name of the New York Free Academy, and it combined the functions of a college and a polytechnic school. It developed steadily, and in 1866 its name was changed to the College of the City of New York. Before 1882 the college was open only to graduates of New York public schools, but since that date any resident of New York City over fourteen years of age is eligible to admission. There are five courses of study leading to the degrees of A. B. and B. S. The advantages for the study of English and for courses in manual training are especially fine. The faculty numbers about 120, and the enrollment exceeds 2400. The library contains 36,000 volumes.

New York, State University of. A department of public instruction established in 1754, under the name *Governors of the College of the Province of New York, in the State of New York, in America.* In 1784 the university was reorganized and placed under control of a board of regents, whose duties comprised the establishing of schools and colleges which should be parts of the university; the supervision of secondary schools, such as high schools and academies, including the outlining of courses of study, the determining of the qualifications for admission and the establishment of standards on which certificates and diplomas of graduation should be given and degrees should be granted; the control of state libraries and museums, and the distribution of state funds for secondary schools.

The duties of the board of regents conflicted with the duties of the department of public instruction, which had the administration of public schools in general. For this reason, in 1904 the educational system of the state was reorganized and the departments of public instruction and the state university were consolidated under the title *The University of the State of New York.* According to this reorganization, the board of regents consists of eleven members elected by the legislature. The offices of secretary of the board of regents and state superintendent of public instruction were abolished and in place of them the office of commissioner of education was instituted. The first commissioner elected by the legislature was Hon. Andrew S. Draper, president of the University of Illinois. His term was for six years, at the expiration of which the commissioner is to be chosen by the board of regents and to hold office during their pleasure. Under this arrangement the educational system of the state has been organized under the following departments: Examinations, inspections, normal schools, training institutes, libraries, scientific work and museums, law, accounts, statistics and apportionments, printing and publications.

New York University, an institution of higher learning, established in New York City and chartered in 1831. It includes the following departments: the university college; the law school; the medical school; the school of applied sciences; the school of pedagogy; the school of commerce, accounts and finance; the graduate school, and the summer school. The faculty numbers about 215, and the enrollment is over 2100. The library contains 77,000 volumes. The university is beautifully situated on the Heights, overlooking the Hudson and Harlem rivers. The most attractive building is the library, which has the colonnade known as the Hall of Fame (See Hall of Fame).

New Zealand, *zee'land,* a British colony in the South Pacific Ocean, about 1200 mi. s. e. of

Australia, lying between 34° 22′ and 47° 20′ south latitude and between 166° 40′ and 178° 38′ east longitude. The colony consists of two large islands, North Island and South Island, separated by Cook Strait, and a third small Island, Stewart Island, about 25 miles south of South Island. The Auckland, the Chatham and other small outlying groups are also attached to the colony, and the total area is estimated at 104,471 sq. mi.

The surface of North Island is characterized by low hills and tablelands, densely forested. There are several volcanic peaks in the island, of which the highest is the extinct volcano Ruapehu, over 9000 feet in height; Tarawera and Tongariro are active volcanoes. There are a number of lakes of volcanic origin, of which the largest is Lake Taupo, which has a diameter of 22 miles and an enormous depth. The coast line of North Island is much indented, but as most of the bays are obstructed by bars, good harbors are few. The physical features of South Island are very different. There are no volcanoes, and the coast line is regular. Along the western coast runs an elevated mountain range, which is known as the Southern Alps and which rivals in its rugged beauty the European Alps. The height ranges from 8000 to over 12,000 feet. Forests cover the mountains to the snow line. On the western slope are great glaciers, while on the eastern slope extends a series of lakes, of which the largest and most beautiful is Lake Wakatipu.

Extending through 13 degrees of latitude and having a greatly diversified surface, New Zealand has necessarily a very varied, though a remarkably healthful, climate. In temperature it resembles France and North Italy, but the humidity is considerably greater. Rapid changes are a notable feature of the weather.

With mineral wealth New Zealand is liberally supplied. Coal is obtained in many parts, and copper has been worked on a small scale. Gold is worked both in North and South Island, and silver, copper, tin, antimony and manganese are found. Of the flora, the most characteristic forms are the ferns, of which there are about 130 different species. In some places these form almost the only vegetation over immense districts. Another characteristic plant, and one of great economic value, is the flax plant. A number of forest trees, among which is the kauri, or damar pine, furnish valuable timber. New Zealand is singularly deficient in animals, there being probably not a single indigenous mammal. Rabbits have been introduced and have multiplied so as to become a pest; and pigs now run wild, as well as cats. Pheasants, partridges, quail and deer have also been successfully introduced. The native birds are remarkable neither for numbers nor for beauty of plumage. Pigeons and parrots are the most common, and the apteryx, a peculiar wingless bird, is the most interesting. The gigantic wingless birds known as moa are now extinct.

The soil and climate of New Zealand are well adapted to the production of every English grain, grass, fruit and vegetable. In the gardens of the warmer valleys, fruits of a semi-tropical character, such as the pomegranate, citron, orange and olive, may be raised. The largest crops are of turnips and rape, and oats, wheat and barley are next in importance. Stock raising, especially sheep grazing, is an industry of primary importance in New Zealand. There are about 19,000,000 sheep in the colony, and by far the most important exports are wool and frozen meat. Other important exports are gold, tallow, timber and kauri-gum.

The first railroad in New Zealand was opened in 1863, and there are at present over 2300 miles of government railway open for traffic.

The original natives of New Zealand, called Maoris, a people of Polynesian origin, are supposed to have emigrated from the Navigator's or the Sandwich Islands some centuries ago. Split up into numerous petty tribes, their numbers have been so much reduced that they now do not exceed 40,000, all of whom, with the exception of a few hundreds, are located in the North Island. By missionary efforts a great part of them have been converted to Christianity. They have acquired in many instances considerable property in stock and cultivated lands, and in the neighborhood of the settlements they are adopting European dress and habits.

Elementary education in New Zealand is free, secular and compulsory for children from seven to thirteen years old. Secondary education is provided for in numerous high schools and grammar schools, for attendance in which a small fee is required. At the head of the higher education is the University of New Zealand, an examining body empowered to grant honors, degrees and scholarships, and affiliated with this are several colleges throughout the colony. There are also training schools for teachers, art schools, engineering institutions and theological schools.

By the constitution, the Crown appoints the governor, who is assisted by a ministry of eight members. The legislative power is vested in a General Assembly, or parliament, of two houses —a Legislative Council, consisting of 44 members who hold office for seven years, and a House of Representatives, consisting of 80 members who hold office for three years. Representatives of the Maoris are admitted into both houses. The Church of England is most numerously represented in New Zealand.

The chief cities are Wellington, the capital; Auckland, Christchurch and Dunedin. Each of these is described under its title.

New Zealand was first discovered by Tasman in 1642, but little was known of it until the visits of Cook in 1773 and 1777. The first permanent settlement was made by missionaries in 1815, but no regular authority was established by the British government till 1833, when a resident was appointed, with limited powers. In 1840 New Zealand was erected into a colony. In 1841 it was formally separated from New South Wales and placed under its own independent governor, and in 1852 it received a constitution and a responsible government. Troubles with the natives of North Island about land gave rise to frequent Maori wars, and as late as 1886 a disturbance about land arose. In 1865 the seat of government was removed from Auckland to Wellington. The movement toward state socialism became prominent in 1890, and progress has been constant and rapid, until now the government controls almost all public utilities. In the South African War, New Zealand loyally supported Great Britain.

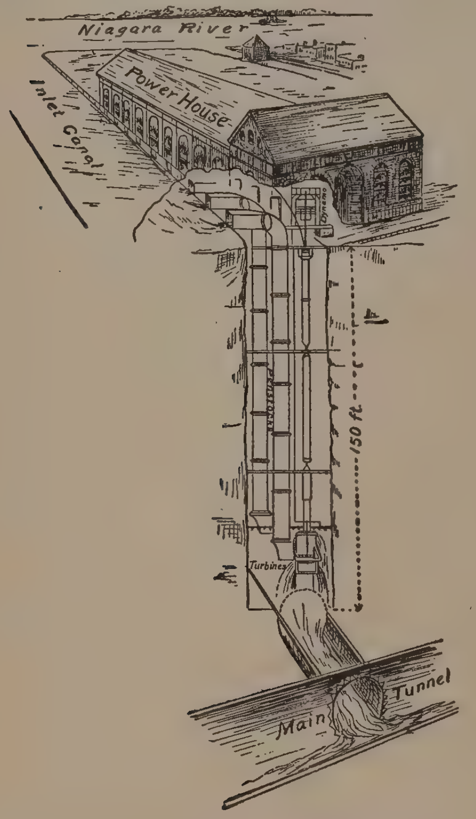
The population of New Zealand in 1901 was 815,862, including about 40,000 Maoris and about 3000 Chinese.

Ney, *nay*, Michel, Duke of Elchingen, Prince of the Moskva (1769–1815), a marshal of France. He entered the military service in 1788 and was a member of a regiment of hussars when the French Revolution broke out. He rose by degrees to the rank of general of division in 1798, and as such he distinguished himself in the Rhine campaign. Appointed marshal of the Empire by Napoleon in 1805, he achieved a victory over the Austrians at Elchingen and took part in the battles of Jena, Eylau and Friedland. During the Russian campaign he commanded the third division at the Battle of the Moskva and conducted the rear guard in the disastrous retreat. In the campaign of 1813 his skill and courage decided the victory of Lützen and were of the greatest service at Bautzen and Dresden. When Napoleon abdicated and the Bourbon dynasty was established, Ney took the oath of allegiance to the king and received a command; but when the emperor landed from Elba his old general joined him at Lyons and opened the way to Paris. When the allies entered Paris he escaped in disguise to the provinces, but was finally arrested, brought back to Paris, tried for treason and executed.

Nez Percé, *na pair say'*, (pierced nose), an indian tribe who formerly lived in the eastern portions of Washington and Oregon and in central Idaho. After giving up their lands and taking new ones, they became displeased at the inroads of the miners upon their new territory, and under Chief Joseph they began a war in which their masterly leader for a long time defeated the regular United States troops. In fact, Joseph finally surrendered only under a promise to be returned to his old reservation. The government proved false to its word, and the indians were moved into the Indian Territory. More than half their number quickly perished there by disease, and in 1884 they were returned to a reservation in northern Washington, where they now remain.

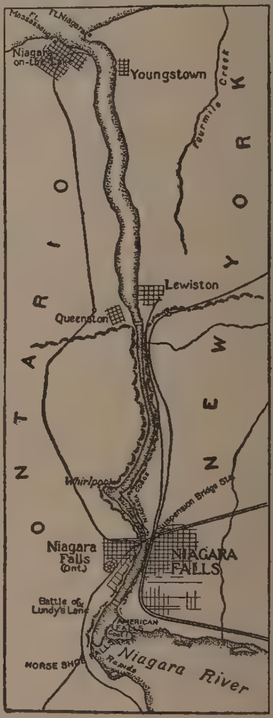
Ngami, *n'gah'me*, a lake of South Africa, to the north of the Kalahari Desert. It was formerly a very large body of water, but it has gradually dried up, until now in the dry season it is little more than a marsh. It was discovered by Livingstone in 1849.

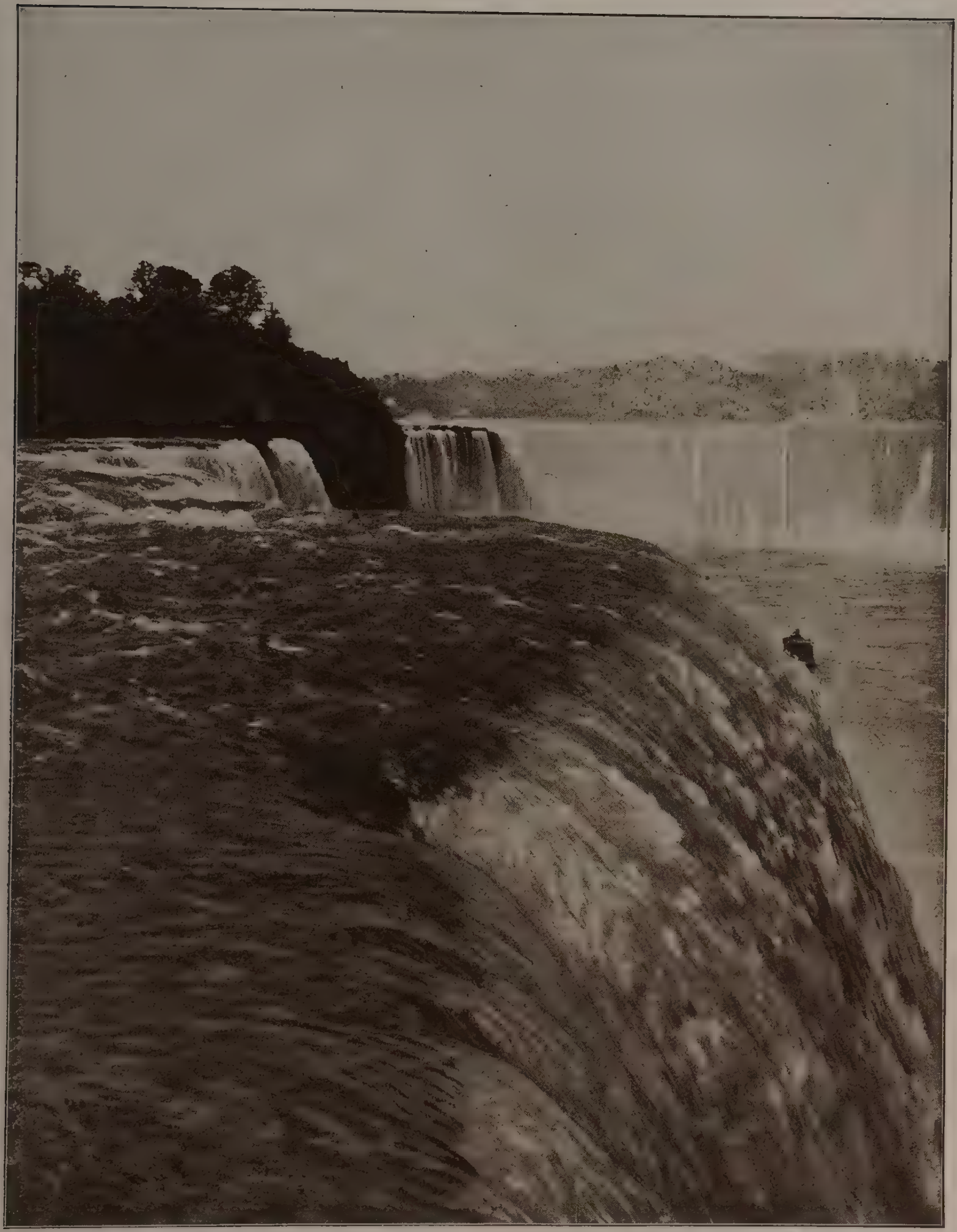
Niag'ara Falls, N. Y., a city in Niagara co., 25 mi. n. w. of Buffalo, on the Niagara River, just below the falls, and on the New York Central, the Wabash, the Erie and several other railroads. A portion of the water power of the falls has been made available by constructing a canal above them, to conduct water to a wheel pit 150 feet deep, at the bottom of which large turbines are placed. After being utilized, the water finds an outlet through a tunnel that opens into the gorge below the falls. Dynamos are attached to the turbines, and an electric current having over 50,000 horse power is generated. About three-fourths of this is used by local manufactories. The remainder is conveyed to Buffalo and employed to furnish power for the street cars, for numerous manufactories and for lighting the city. The principal products are paper, flour, dressed lumber, shredded wheat biscuits, aluminum, carbide, carborundum, electro-chemical goods, foundry products, machinery, chemicals and bleaching powder. De Veaux College and Niagara University are located here, and the city has a Carnegie library and good public and parish schools. The state reservation here includes the land and the islands surrounding the American side of the falls and covers 107 acres. The city is connected with Canada by three very remarkable bridges. In 1892 the villages of Niagara Falls and Suspension Bridge were consolidated and chartered as the city of Niagara Falls. Population in 1905, 26,560.



Niagara Falls and River. Niagara River connects Lake Erie with Lake Ontario and separates the State of New York from the Province of Ontario. The river is 33 miles long and has a fall of 331 feet between the two lakes. In the upper part of its course, for about 16 miles, the stream flows through a broad plateau, with scarcely any valley. Near the lower edge of this plateau is Grand Island, whose area is 17,000 acres, separating the river into east and west branches. After the branches reunite, the river flows quietly for a short distance and has a channel between two and three miles wide, which contains a number of islands. It then narrows and makes a rapid descent, forming the rapids over which the river falls 52 feet in a short distance. At the foot of the rapids are the falls, which are divided by Goat Island into two cataracts, known as the Canadian, or Horseshoe, Falls, on the west, and the American Falls, on the east.

The cataract Niagara is caused by the river's falling over a ledge of hard limestone, which is underlaid by layers of softer rock. This ledge outcrops a few miles south of Lake Ontario, and the Niagara Gorge, below the falls, has been formed by the wearing away of this rock by the cataract during the thousands of years that the river has occupied its present channel. The tremendous velocity of the water as it approaches the edge of the falls throws it out from the foot of the cliff to a distance of 20 or 30 yards. The lower strata of the rock under the falls have been worn away more rapidly than the upper layer, over which the water is precipitated, thus forming a sort of cave, into which visitors can enter, both at the outer end of the Canadian Falls and near Goat Island on the American side. In each of these places paths have been excavated and platforms built, which enable sightseers to obtain a magnificent view of the falls. The place of entrance near Goat Island on the American side is known as the Cave of the Winds. The Canadian Falls, which are by far the larger, have an extent, measured on the curve, of 3010 feet, or on the chord of the circle, of 1230 feet. The height is 158 feet, and the depth of the water near the center of the fall exceeds 20 feet. The American Falls have a length of 1010 feet and a height of 167 feet, but the volume of water is far less than that in the Canadian Falls.





From stereograph; copyright 1904 by Underwood & Underwood, N. Y.

NIAGARA FALLS, FROM PROSPECT POINT

Below the falls the river flows through a gorge for about seven miles. For a good portion of the way the gorge is deeper than the height of the falls, and its sides are nearly perpendicular, so that it can be ascended in only a few places. For a portion of its course through this gorge the water moves quietly, but when it reaches a point about 2½ miles below the falls, the water is precipitated over another series of ledges, forming the famous Whirlpool Rapids, which in many respects excel the falls in grandeur. Below these rapids the river makes a sharp turn to the left, and the force of the current has worn in the rock a large circular basin, around which the turbulent waters continue to flow, striving to find an outlet in the channel below. This forms the Whirlpool, which is the greatest maelstrom in the world. Below the Whirlpool the slope in the gorge is more gentle, and the waters flow with continually decreasing velocity until they reach the Ontario plain, about seven miles from the mouth of the river.

The river and falls of Niagara furnish some of the grandest spectacles of natural scenery in the world and are visited by thousands of tourists every year. In order that these places of interest could be visited without unnecessary expense and annoyance, the State of New York in 1885 secured control of the tract of land adjoining the falls and established Niagara Falls Park, which includes Goat Island and other small islands adjacent to it. The year following, the Canadian government established Victoria Park on the opposite side of the river. An electric railway on the American side extends down the gorge to near Lewiston, following the foot of the cliff, and on the Canadian side a similar railway has been built along the bluff. The lower suspension bridge now connects these lines, so that the visitor can make a circuit of the region, passing on one side on the top of the bluff and on the other at its foot, thus obtaining excellent views of all points of interest.

The Niagara gorge near the falls is spanned by three bridges, the first, a steel arch bridge for carriages and electric cars, about ⅛ of a mile below the falls; the second, the cantilever bridge of the Michigan Central Railway, about 2 miles below the falls; and the third, the steel railroad bridge of the Grand Trunk railway, which was erected to replace the old suspension bridge, the first large structure of its kind erected in America (See BRIDGE, subhead *Suspension Bridges*).

The building of power houses and factories along the shores of Niagara River and Falls (See NIAGARA FALLS, N. Y.) threatened for a time to destroy the grandeur of the view, by turning the main current from its natural channel, leading over the falls, to underground sluiceways and tunnels, where it generated power. The amount of water thus used had already made an appreciable difference in the volume of the cataract, and plans were completed for large extensions of the plants, when by a joint effort of the national government of the United States and the Dominion government of Canada, aroused by a popular agitation, provision was made for restricting the amount of water used for industrial purposes. Thus, one of America's greatest spectacles was at least temporarily saved.

Niagara Series, a division of rock formations belonging to the Silurian system and lying between the Trenton series, below, and the Salina, above. The formations are prominent in central and western New York and extend southward along the line of the Appalachian Mountains as far as Alabama, westward through Ohio, Indiana and Illinois and northward into Wisconsin. One of the formations contains extensive beds of hematite, reaching from Pennsylvania to Birmingham, Ala., where it becomes the source of supply for the iron and steel works of that locality. The formations include shale, sandstone and limestone. These different strata can be plainly seen in the gorge at Niagara Falls, where the disintegration of the limestone, caused by the wearing away of the upper strata, has caused the falls. See GEOLOGY; SILURIAN SYSTEM; TRENTON SERIES.

Nibelungenlied, *ne'be loong'en leet'*, one of the earliest and the greatest of national German epics, which, in some form or other, has existed from the thirteenth century. It is of unknown authorship and is, like most of the great national epics, rather a growth from separate ballad poems than a performance completed at any one period. It was originally founded on the story of Sigurd in the *Elder Edda*, and additions were made to it from time to time. The main story is as follows: Siegfried, heir of the king of the Netherlands, was besought by Gunther to aid him in winning Brunhilde of Iceland to be his wife. Brunhilde was to be won only by the man who could conquer her, and Siegfried, in Gunther's form, was able to do this only by obtaining help from the gods. Siegfried, in return for his aid to Gunther, was given Kriemhild, Gunther's sister, as his wife. Some years later a quarrel arose between Kriemhild and Brunhilde, and Kriemhild boasted that it was her husband whose strength had conquered Brunhilde. Greatly enraged, Brunhilde induced one of Gunther's vassals, Hagen, to put Siegfried to death. Kriemhild, after a long mourning for Siegfried, married Etzel, king of the Huns. Meanwhile, the treasure of the Nibelungs, which had belonged to Siegfried and which carried with it a curse for its possessor, had been seized by Hagen, who threw it into the Rhine, intending later to rescue it. Years after her marriage to Etzel, Kriemhild invited her brother and his court to visit her, intending to avenge Siegfried's death. During the visit a combat arose between Gunther's followers and Etzel's, with the result that all of Gunther's people were killed, Kriemhild herself beheading Gunther and Hagen, when the latter refused to tell where the Nibelung treasure was buried. Kriemhild was killed by Hildebrand, a vassal of Etzel. As the knowledge of the hiding place of the Nibelung treasure died with Hagen, it is supposed still to lie at the bottom of the Rhine. Wagner has used this story as the basis of the musical drama *Ring des Nibelungen.*

Nicaea, *ni se'ah,* or **Nice,** *nees,* an ancient city of Asia Minor, capital of Bithynia. In the Roman Empire it held a high rank among eastern cities, and it is renowned in ecclesiastical history for the famous council held there in the reign of Constantine (See NICE, COUNCILS OF). After the foundation of the Latin empire in Constantinople, in 1204, the Greek emperor, Theodore Lascaris, made Nicaea the capital of his empire. It continued to be the capital until the recovery of Constantinople by the Greek emperors, and it was finally taken by the Turks in 1326.

Nicaragua, *ne ka rah'gwa,* a republic of Central America, extending from the Pacific Ocean to the Caribbean Sea, bounded on the n. and n. e. by Honduras and on the s. by Costa Rica. Its area is 49,200 square miles. The state is traversed by the Cordillera of Central America, between which and the Pacific coast there is a depression extending for 300 miles and containing Lake Nicaragua and Lake Managua. Along the coast is a chain of volcanic cones, which rise in some places to about 6000 feet. From the Cordillera the surface slopes to the Caribbean coast, which is low and swampy. Nicaragua has numerous rivers, the chief of which flow to the Caribbean Sea. The San Juan is the only one which is of any importance for navigation. The climate throughout the greater part of the country is healthful, especially in the higher parts of the interior, where it is cooler and drier than on the coasts. In some parts of the country the rainfall is over 200 inches in the year, while on the Pacific coast it is less than 80 inches.

Veins of copper, gold and silver occur, but only the gold mines are worked to any extent. The vegetable productions include indigo, sugar, coffee, tobacco, cacao, cotton, maize, rice, bananas and rubber. Fruits of various kinds are plentiful, and fine oranges and lemons are produced. One of the principal sources of wealth consists in cattle, of which there are great numbers, the high plain affording excellent pasturage. The principal exports of Nicaragua are coffee, hides, dyewood, bananas and indigo. Transportation facilities are poor, there being only about 175 miles of railroad in operation and few good roads in the interior. This deficiency is in part remedied by the steamship line on San Juan River and Lake Nicaragua.

The Republic is governed by a president elected every four years and a congress of one house, elected every two years by universal suffrage. Education is in a very backward state, the majority of the people being illiterate. While Roman Catholicism is the State religion, there is complete freedom of worship. The chief towns of Nicaragua are Managua, the capital; Leon, the largest city, and Granada. Population in 1900, estimated at 500,000, the majority of whom are indians, mulattoes and negroes.

Nicaragua, LAKE, an extensive sheet of water in Central America, in the Republic of Nicaragua, about 100 mi. long from northwest to southeast and about 45 mi. wide at its broadest point. It is about 110 feet above the Pacific, from which it is separated by a strip of land 13 miles wide. The river San Juan flows from the southeastern extremity into the Caribbean Sea, and at its northwestern extremity the lake receives, through the Tipitapa River, the waters of Lake Managua. Lake Nicaragua contains several islands, the largest of which is Ometepe. For the proposed use of Lake Nicaragua as a part of the interoceanic canal, see NICARAGUA CANAL.

Nicaragua Canal, a canal projected across the Isthmus of Nicaragua, to connect the Atlantic and Pacific oceans. As originally surveyed, this canal was to extend from Greytown, on the Caribbean Sea, to Brito, on the

Pacific Ocean. The length was 183.86 miles, of which 70.51 was to be through the San Juan River and Lake Nicaragua. In 1849 a concession for constructing a canal was granted a company headed by Cornelius Vanderbilt. However, nothing practical was accomplished for forty years. In 1889 the Maritime Canal Commission was organized, and this was followed in 1899 by the Walker Commission, authorized by Congress to investigate thoroughly the route and to report upon the practicability of the enterprise. This commission made a favorable report, and for a time it seemed probable that the canal would be constructed in accordance with its recommendation. However, before negotiations with Nicaragua were completed in 1902, the Panama Canal Company of France offered to sell its franchises and property to the United States for the valuation placed upon them by the canal commission. This offer was accepted, and interest was transferred to the Panama Canal (See PANAMA CANAL).

Nic'colite. See COPPER-NICKEL.

Nice, *nees,* a city and seaport of France, capital of the Department of Alpes-Maritimes, situated on the Mediterranean, near the base of the Alps, 84 mi. n. e. of Toulon. Its location is beautiful, and as the climate is mild and invigorating, the city is very popular as a health resort during the winter. There are two divisions of the town, the old and the new, the former comparatively unattractive, with its narrow, crooked streets; the latter made beautiful by many handsome squares and public buildings. The Casino, the cathedral, the theaters and the public library are among the most noteworthy buildings of the city. Nice possesses silk, cotton and paper mills, oil mills and manufactories of tobacco, leather, soap, wine and straw hats. Previous to 1860 Nice belonged to Italy, but in that year it was ceded with other territory to France, as reward for her aid to Italy in the war against Austria. Population in 1901, 78,480.

Nice, COUNCILS OF, ecclesiastical councils held at Nice, or Nicaea, in Asia Minor, in 325 and 786. The object of the first council of Nice, which was convened by Constantine, was to settle the controversies which had arisen in regard to the doctrine of the Trinity. The session lasted about two mouths. A creed was adopted which in its later form is known as the Nicene Creed. The council of 786 was summoned by Empress Irene, with the concurrence of the pope, and decreed that images were to be used as aids to devotion. See ICONOCLASTS.

Nicene, *ni'seen* or *ni seen',* **Creed,** a summary of the chief tenets of Christian faith, adopted by the Council of Nice in 325 A. D. It is, next to the Apostles', the oldest of creeds, and it is acknowledged to the present day, not only by the Roman Catholic and Greek churches, but by most Protestant churches as well. It is founded upon the baptismal creed of the Church of Caesarea in Palestine, its essence being the expression of the belief that "Christ is of the *same* substance with the Father."

Nicholas I Pavlovitch, *nik'o las pahv'lovich,* (1796–1855), emperor of Russia, ascended the throne in 1825, on the death of his brother, Alexander I. He made war on Persia; joined in the Treaty of London, which secured the independence of Greece, and took part with the allied powers in the destruction of the Turkish fleet at Navarino in 1827. This affair led to war between Russia and Turkey, in which the latter was defeated. Nicholas suppressed the Polish insurrection, which broke out in 1830, with relentless severity, and in 1848 he assisted Austria in putting down the rising in Hungary. Early in 1852 began the Russian effort to take over the holy places and assume the protectorate of the Greek Church. This led to the Crimean War, before the close of which Nicholas died.

Nicholas II (1868–   ), emperor of Russia, eldest son of Alexander III. He was carefully educated, and traveled extensively before his accession to the throne on the death of his father in 1894. His formal coronation took place in Moscow in 1896. At the outset of his reign, he showed himself an energetic, if autocratic, ruler. In 1906, after repeated demands had been made, he consented to the assembling of the Duma, a body which possesses some of the privileges and characteristics of a representative assembly. Nicholas was married in 1894 to Princess Alexander Alix, daughter of the grand duke of Hesse. (See illustration on next page.)

Nicholas, SAINT (?–326), a saint greatly reverenced in the Roman Catholic Church, on account of the many miracles he is supposed to have wrought. From early times, feasts were held in his honor in England and in Germany, and the sixth of December is still held sacred to him in Germany. His feasts became confounded with the Christmas festivities, and Saint Nicholas, or Santa Claus, as he is called in

Dutch, came to be regarded as the patron saint of Christmas.

Nicias, *nish'e as,* an Athenian statesman and general, active during the Peloponnesian War. He was one of the leaders of the aristocratic party, and he was the opponent, after the death of Pericles, of the demagogue Cleon. In the campaigns against the Spartans, he met with some successes, and in 421 he brought about a peace between Sparta and Athens, which was known as the Peace of Nicias. When, in 415, he was appointed one of the leaders in the expedition against Sicily, he used his influence to prevent the expedition, but in vain. His fleet suffered a defeat, and his troops, retreating across Sicily, were forced to surrender. Nicias himself was put to death by the Syracusans (413 B. C.)

NICHOLAS II

Nick'el, a metal of a white color, of great hardness, always magnetic, and when perfectly pure, malleable and ductile. It is, however, very hard to purify. It unites in alloys with gold, copper, tin and arsenic, which metals it renders brittle. With silver and iron, its alloys are ductile. Nickel is found in all meteoric stones, and deposits of ore occur in various countries of Europe, but the most important mines are at Sudbury, Ontario, from which more than half the world's supply is obtained. Nickel, mixed with brass in varying proportions, is now well known and largely used as German silver, or nickel silver. It is also used for small coins and in electroplating. See PLATING.

Nickel Silver. See GERMAN SILVER.

Nicobar, *nik o bahr',* **Islands,** a group of islands in the Indian Ocean, at their nearest point 130 mi. from Sumatra. With the Andaman Islands, they form an extension of the volcanic chain which includes Sumatra and Java. The area of the largest of the islands is 337 square miles; the area of the whole group is 635 square miles. The soil is fertile, and cocoanuts, oranges, sugar and bamboo grow in abundance. The inhabitants, who are chiefly Malays, depend for their support largely on the trade in cocoanuts and copra. Population in 1901, 6310.

Niebuhr, *ne'boor,* BARTHOLD GEORG (1776–1831), a German statesman and historian. After serving for a time under the Danish government, he moved in 1806 to Berlin and there entered the Prussian service. In 1810 he was appointed historiographer royal, and delivered at the University of Berlin a course of lectures on Roman history, which were afterward published in two volumes. During the six years which he spent in Rome as Prussian minister to the papal court, he occupied himself with historical research, and the result of this was his important work, *The History of Rome Down to the First Punic War.* The great value of this book lies in the fact that it was the first in which truly critical methods were applied to Roman history and in which many of the commonly accepted legends were discarded.

Niello, *ni el'lo,* a method of ornamenting metal plates, which gave rise to copperplate engraving. The lines of a design are cut in the metal and filled up with a black or colored composition, after which the surface is smoothed down and burnished. Sometimes, especially in modern work, the black pattern is made to stand out in relief. This art was in very common use under the Byzantine Empire, and to-day it is practiced extensively by the Russians and to a certain extent by the silversmiths of western Europe.

Niemen, *ne'men,* a river of Russia and Prussia, which rises near the city of Minsk, in Russia, flows westward, then northward between West Russia and Poland, then westward again into Prussia, where it is known as the Memel. It empties into the Kurisches Haff, after a course of about 550 miles. It is navigable for about 450 miles.

Niflheim, *nif'l hime,* in Scandinavian mythology, the region of endless cold and everlasting night, ruled over by Hel. Besides the wicked, all those who died of sickness or of old age were cast into Niflheim, and as existence there, even for the good, was but a negative sort of happiness, many men and women preferred to put themselves to death rather than to meet the inglorious fate of dying in their beds.

Niger, *ni′jur,* or **Jol′iba,** a great river of western Africa, after the Nile and the Kongo the largest of that continent. It rises on the inner frontiers of Sierra Leone and Liberia, flows north and northeast, then turns southeast and south, until by various channels it enters the Gulf of Guinea. Its total length is about 2500 miles. At different points in its course, it is known under various names, such as Joliba, Issa, Mayo and Kwara, or Quorra. At Sego, about 340 miles from its source, it enters upon a fertile tract of country, which continues until Timbuktu is reached. Here large islands divide the river channel, and its tendency is to spread over the flat country in a network of small streams. Below Timbuktu it narrows to a width of 300 feet and flows through a rocky gorge. After flowing for a time through a desert region, it enters a fertile and populous territory. Near Abo, about 80 miles from the sea, the great delta of the Niger begins. This delta extends along the coast for about 150 miles and is intersected by a network of channels and islands, the chief mouths being the Nun, the Forcado and the Bonny. The Nun is the only one of the mouths which is navigable for large vessels. The Niger River was first explored by Mungo Park in 1796 and 1797.

Nigeria, *ni je′re a,* the name of a large region lying on the west coast of Africa and bordering on the Gulf of Guinea. It is bounded on the w. by Dahomey, on the n. by the Sahara, on the e. by German Kamerun and on the s. by the Gulf of Guinea. Lake Tchad touches the northwest corner. The area of the country is about 400,000 square miles, and it is estimated to contain 20,000,000 people, who are divided among a large number of native kingdoms. Among the peoples are Hausas and Kotos (See RACES OF MEN, *color plate, Negro Types,* Fig. 1). Nigeria is now under British control and for administrative purposes has been divided into Northern Nigeria, occupying about three-fourths of the region, and Southern Nigeria, including the southern fourth of the country. The Niger River flows across the western portion. Much of the country is covered with dense forests and produces gums, various kinds of balsams, palm oil, ivory, india rubber, indigo and other tropical products. The seat of government of Northern Nigeria is Zungru, and of Southern Nigeria, Old Calabar.

Night Hawk, in the United States the name of a bird closely related to the whip-poor-will and strongly resembling it in many ways. It has an exceedingly vigorous flight and takes its prey, consisting of beetles and other large insects, on the wing, usually in the evening. It may then be seen flying rapidly, making long descending swoops, with a hoarse whirring of its wings. The night hawk spends the day quietly sitting on the ground. Its eggs, two in number, are laid on the bare ground, with no attempt at protecting them by a nest.

Night Her′on, a small, restless bird, not graceful like the true heron. It is found in the United States and over Europe, Asia and Africa. It breeds in large flocks in the northern part of the United States, where it builds a coarse nest on a bush or tree, returning to the same one year after year. The night herons are timid creatures, and as their young are esteemed as food, they have been much hunted during the breeding season.

Night′ingale, a well-known bird of the thrush family, found in Europe, Asia and Africa. It is a little brown creature, not much larger than our bluebird, and is everywhere famous for the beautiful night song of the male during the breeding season. On moonlight nights it often sings in woods and shrubbery till long after midnight, but in the daytime it is shy and rarely seen or heard. The bird is referred to in the poetry of all countries and is spoken of by its classical name, philomel, or its eastern name, bulbul.

NIGHTINGALE

Nightingale, FLORENCE (1820–), an English philanthropist, born in Florence, Italy.

At an early age she became interested in hospital work, visited the chief military hospitals in Europe and studied the nursing systems. During the Crimean War the hospital accommodation was found to be very defective, and Miss Nightingale promptly volunteered to organize a band of nurses at Scutari. The offer was accepted by the government, and within a week she was on her way to the East, where she rendered invaluable service to the sick and wounded by her incessant labors in nursing and in hospital reform. The strain, both mental and physical, which this work demanded, permanently injured her health; yet, notwithstanding her confinement to a sick room, she continued to give her assistance in the interest of hospital reform, and for this purpose she was consulted during the Civil War and the Franco-German War. She published *Notes on Hospitals*, *Notes on Nursing*, *Notes on the Sanitary State of the Army in India* and *Life or Death in India.*

FLORENCE NIGHTINGALE

Night'mare, a state of oppression, or a feeling of suffocation, which sometimes comes on during sleep, and is accompanied by intense anxiety, fear or horror. The sufferer feels an enormous weight on his chest and dreams that he is pursued by a phantom or wild beast or that he is threatened by some other danger, from which he can make no motion to escape. After a short time he awakens in a state of great terror, often with his body dripping with perspiration. It is supposed that the immediate cause of nightmare is some irregularity in the circulation of the blood in the chest or brain, caused by indigestion or by a strained or unnatural position of the body.

Night Schools. See EVENING SCHOOLS.

Night'shade, the English name of various species of plants, chiefly of the genus Solanum, to which the potato belongs. The woody nightshade, or bittersweet, and the common, or garden, nightshade, are British plants, the first growing in hedges and among bushes, and the latter in gardens, fields and waste places. The *black nightshade* bears small black berries and small heads of white flowers. It is poisonous and narcotic and has also been employed medicinally. The name is sometimes applied to other plants; for instance, the belladonna, which is often called the *deadly nightshade.*

Ni'hilists, the name at first applied specifically to the revolutionary party in Russia who accepted anarchism (See ANARCHISTS), but now applied indiscriminately to Russian revolutionists. This name was first given to the party about 1860 by Tourgenieff in his stories of Russian society. Their object was to destroy all forms of government, overturn all institutions, annihilate all class distinctions and sweep away all traditions. For some years this propaganda was spread in printed and oral forms among the serfs by thousands of young people of both sexes. About 1874, however, the Russian government began to interfere, the newspapers which advocated the Nihilist doctrine were suppressed and large groups of the revolutionists were summarily tried and condemned to death or exile. Thereafter the Nihilists adopted a secret and bloody program. The first startling indication of the new departure was the murder of high officials. The incendiary followed the assassin. In June, 1879, no fewer than 3500 fires broke out in Saint Petersburg and other large towns, most of which were attributed to the Nihilists. Various attempts were made to assassinate the emperor, and at last, in 1881, Alexander II was murdered by a bomb thrown beneath his carriage in the street near the palace. This terrible act seemed to exhaust the fury of the Nihilists, and since that time their doctrines have been similar to socialism and have been more peaceably promulgated.

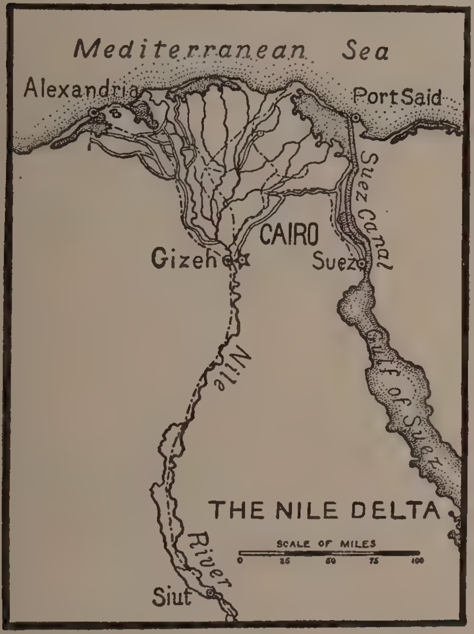
Niigata, *ne′e gah′ta,* a city and port of Japan, situated on the west coast of the island of Hondo, at the mouth af the Shinano. It is a well-built town, and many of its streets are traversed by canals. The port was opened to foreign commerce by the treaty of 1858, but the obstructed state of the river, the open anchorage and the severe winters have hitherto prevented the development of much trade. There is, however, a considerable coasting trade in petroleum.

Nijmegen, *ni′ma gen.* See Nimeguen.

Nijni-Novgorod, *nyeezh′nye nov′go rod.* See Nizhni-Novgorod.

Ni′ke Ap′teros or **Athene Nike,** Temple of, a beautiful temple of the Doric order, standing on the site of the entrance to the Acropolis at Athens, built in the Age of Pericles and consecrated to Athene. It is 18 by 27 feet and has four Ionic columns, 43½ feet in height, in the front and rear. The frieze contains sculptures representing historical and mythological scenes. The building was torn down by the Turks in the last part of the seventeenth century, but in 1835 it was rebuilt, the missing parts being filled in.

Nile, a great river of Africa, the main stream of which, known as the Bahr-el-Abiad, or White Nile, has its chief source in the equatorial lake Victoria Nyanza. What is known as the Blue Nile, a much smaller stream, joins the White Nile at Khartum. The Nile, near where it flows out of Lake Victoria, forms the unimportant Ripon Falls, then flows generally northwest and afterward forms the Falls of Karuma and the Murchison Falls. Then, after a further course of 30 miles, it enters another lake, the Albert Nyanza, at an elevation of about 2300 feet. From the Albert Nyanza to the Mediterranean the general course of the Nile is in a northerly direction, with numerous windings. Above Gondokoro the river forms a series of cataracts; but between these falls and the Albert Nyanza, a distance of over 150 miles, the river is broad, deep and navigable. Not far below Gondokoro the Nile begins to flow more to the west, until it reaches Lake No, where it receives the Bahr-el-Ghazal, one of its chief tributaries. On receiving this affluent it turns due east for about 100 miles, and then, after receiving the Sobat from the southeast, it flows almost due north to Khartum. It receives its last tributary, the Atbara, from the Abyssinian frontier. Between this point and the frontiers of Egypt occur several rapids or cataracts, presenting greater or lesser obstacles to navigation. In Egypt, at the head of the Delta, near Cairo, the river divides into two main branches, leading down respectively to Rosetta and Damietta, where they enter the Mediterranean.



As rain scarcely ever falls in the greater part of the valley of the Nile, the river owes its supplies to the copious rains and the vast lake areas of the tropical regions in which it takes its rise, and its volume thus depends upon the season. It begins to increase in June, attains its greatest height about September and then subsides as gradually as it rose. The ordinary rise at Cairo is about forty feet. During the flood a great portion of the Delta and of the valley of Egypt is inundated. This annual inundation, with all the rich soil which it brings, is the reason for much of the fertility of Egypt, and no doubt it was for this reason that the Nile was worshiped as a god, alike by Egyptians, Greeks and Romans. The total length of the river is estimated at about 3670 miles, or rather less than that of the Mississippi-Missouri. The dotted lines in the accompanying map indicate the route of the Cape-to-Cairo railway and its connections.

Niles, Ohio, a city in Trumbull co., 58 mi. s. e. of Cleveland, on the Mahoning River and on the Erie, the Pennsylvania and other railroads. It is a manufacturing place, producing mining and mill supplies, galvanized iron, foundry products, automatic presses, railroad cars, incandescent lamps and various other articles. The place was first incorporated in 1864. Population in 1900, 7468.

Nilsson, *nil'son,* CHRISTINE (1843–), a Swedish soprano, born at Hassaby, in Sweden. Accompanied by her brother, she used to sing at village fairs and places of public resort, where she also played on the violin. In 1857 her talent attracted the attention of a wealthy gentleman, who had her educated as a singer at Stockholm and afterward at Paris. In 1864 she made her first professional appearance, in *La Traviata,* at Paris, and was received with enthusiasm. On several occasions she sang in America with the utmost success. In 1872 she married M. Auguste Rouzaud, who died in 1882; in 1886 she married Count Miranda.

Nim'bus, a term applied in art, especially in sacred art, to a kind of halo, or disk, surrounding the head, in representations of divine or sacred personages. It was first used in Christian art in the fifth century and took various forms. The nimbus in representations of God the Father is of a triangular form, with rays diverging from it in all directions; the nimbus in representations of Christ contains a cross more or less enriched; that of the Virgin Mary consists of a circlet of small stars, and that of angels and saints of a circle of small rays. When the nimbus is of a square form it indicates that the person was alive at the time of delineation.

Nimeguen, *nim'e gun,* a city in the Province of Gelderland, in the Netherlands, delightfully situated on the slopes of several hills, which stretch down toward the Waal. It has a fine old church and a Renaissance townhall of the sixteenth century. The industrial occupations include tanning, brewing and the manufacture of eau de cologne, cotton goods and metal goods. The town is celebrated for the treaties of peace concluded there, in 1678, between France and Holland and Spain, and in 1679, between the German Empire and France. Nimeguen was formerly a strong fortress, but the fortifications have been demolished. Population in 1900, 42,756.

Nîmes or **Nismes,** *neem,* a city of France, capital of the Department of Gard, 174 mi. S. S. W. of Lyons. It has an ancient cathedral, an old citadel and a number of striking public buildings. It is chiefly noted, however, for its Roman remains, which include a temple 76 feet long and 40 feet wide, ornamented with Corinthian columns. This temple contains a collection of Roman relics. The manufactures of Nimes are chiefly of silk and cotton goods. It has a considerable commerce and is the great center of southern France for trade in silks. The city is supposed to have been founded by a Greek colony, and was for about five hundred years in the possession of the Romans, under whom it attained considerable importance. In the sixteenth century it became a stronghold of Calvinism, and it suffered much during the civil wars. Population in 1901, 80,605.

Nim'rod is described in *Genesis* x, 8-12, as a descendant of Ham, a son of Cush, a mighty hunter before the Lord.

Nim'rud, the name given to the site of an ancient Assyrian city, situated in an angle formed by the Tigris and the Great Zab, about 20 mi. S. of the ruins of Nineveh. It is one of the group of great cities which clustered around Nineveh, and it has been supposed from inscriptions found in the ruins that it is identical with the Calah mentioned in *Genesis* x, 11.

Nin'eveh, an ancient city, capital of the Assyrian Empire, in Asiatic Turkey, on the left bank of the Tigris, opposite the town of Mosul (See ASSYRIA). It remained the capital of Assyria until about 606 B. C., when it was taken and destroyed by the Medes and Babylonians. Local tradition maintained that Nineveh was buried on the left bank of the Tigris, but the fact was not settled until in 1842 Botta began excavations in the vast mounds there. He was followed in his work by Layard and later by Loftus, Hormuzd Rassam and George Smith, and the most extraordinary results were obtained. Vast palaces, a royal library, sculptures and innumerable small objects of every kind have been uncovered, and the walls of the city with their elaborate outworks, moats and defenses can still be traced. The movable relics have been deposited in the British Museum.

Ning'-po', a city of China, in the Province of Che-kiang, one of the ports open to foreign commerce. It is on the Tatsish River, about 12 miles from the sea. It is surrounded by a wall 25 feet high, and its most remarkable edifice is the great Ning-po pagoda, now partly in ruins. The manufactures consist chiefly of silk and cotton goods, carpets, furniture, gold and silver wares and confections. The principal exports are tea, silk and raw cotton; the principal imports, sugar and opium. Population in 1903, estimated at 260,000.

Niobe, *ni'o be,* in Greek mythology, the daughter of Tantalus, married to Amphion, king of Thebes. Proud of her numerous children, she provoked the anger of Apollo and Diana by boasting to their mother, Latona, who had but the two children. She was punished by having all her children put to death by those two deities, and she herself was changed by Jupiter into a stone, which shed tears during the summer. This fable has afforded a subject for art and has given rise to the beautiful group in the tribune at Florence, known by the name of *Niobe and her Children.*

NIOBE

Nip′igon or **Nepigon,** a lake of Canada, in Ontario, about 30 mi. n. w. of Lake Superior. Its greatest length is 70 miles, and its width, about 40 miles. It has rugged headlands, deep bays and many islands. The Nipigon River connects it with Lake Superior.

Nip′issing or **Nepissing,** a lake of Canada, in Ontario, n. e. of Lake Huron. Its coast line is very irregular. Its length is about 55 miles, its greatest breadth, 20 miles. It contains numerous islands, and finds its only outlet by French River into the Georgian Bay.

Nip′pon, the former name of Japan. See JAPAN.

Nip′pur, an ancient city of Babylonia, situated about 50 mi. s. e. of Babylon, between the Euphrates and the Tigris. The University of Pennsylvania has carried on extensive excavations at this place and has obtained a large collection of cuneiform inscriptions. The present name of the place is Nuffar.

Nirvana, *neer vah′na.* See BUDDHISM.

Ni′san, a month of the Jewish calendar, the first month of the sacred year and the seventh of the civil year, answering nearly to our March. It was originally called Abib, but was called Nisan after the Captivity.

Nismes, *neem.* See NIMES.

Ni′trate, a salt of nitric acid. The nitrates are generally soluble in water and are easily decomposed by heat. The most valuable of these is silver nitrate (See LUNAR CAUSTIC). The nitrates of lead and of iron are used in medicine, and the nitrates of barium and strontium are employed in the manufacture of fireworks (See SALTPETRE). Deposits of nitrates are present in small quantities in almost all soils, and enormous accumulations of nitrate of soda exist in Chile and Peru. These latter deposits, which are known as Chile saltpetre, or cubic nitre, are found near the coast and have been produced from remains of marine animals and birds. The great value of this nitrate is in its application in agriculture, as a fertilizer of impoverished soil; for it is now well known that crops require large quantities of nitrogen to secure their full development. The nitrates should not be used on light, porous soils where the rain will sink the manure below the range of the roots.

Nitre, *ni′tur.* See SALTPETRE.

Ni′tric Acid, an important and powerful compound, formed of hydrogen, oxygen and nitrogen. When pure, it is a colorless liquid, very strong and disagreeable to the smell and so acrid that it cannot be safely tasted unless much diluted. It is known in the arts as *aqua fortis,* and it is commonly obtained by distilling nitre (potassium nitrate) or Chile saltpetre (sodium nitrate) with strong sulphuric acid (See SALTPETRE). Nitric acid contains about 76 per cent of oxygen, a great part of which it readily gives up to other substances, acting thus as a powerful oxidizer. Thus, many metals, such as copper, tin and silver, when brought into contact with this acid are oxidized at the expense of the acid, with the production of lower oxides of nitrogen and metallic salt. Nitric acid, when moderately dilute, acts on organic bodies so as to produce a series of most useful substances, notably, acetic, oxalic and picric acids and isatin, or white indigo. By replacement of the hydrogen in nitric acid, a series of salts termed *nitrates* is obtained. When nitrates are heated with combustible bodies, an explosion is generally produced (See NITRATE). A mixture of strong hydrochloric and nitric acids is known as *aqua regia, nitromuriatic* or *nitrohydrochloric, acid.* Nitric acid is employed in etching on steel or copper; as a solvent of tin, to form with that metal a mordant for some of the finest dyes; in metallurgy and assaying, and in medicine—in a diluted state, as a tonic and as a substitute for mercurial preparations and in the form of vapor, to destroy contagion.

Ni′troben′zol, a liquid prepared by adding benzol drop by drop to fuming nitric acid. It closely resembles oil of bitter almonds in flavor and is largely employed as a substitute for that oil in the manufacture of confectionery and in the preparation of perfumery. It is important as a source of aniline (See ANILINE).

Nitrogen, *ni'tro jen,* an important elementary substance, the basis of nitric acid and the principal ingredient of atmospheric air. It is a colorless, invisible gas, called by Lavoisier *azote,* because it is incapable of supporting life. The name nitrogen was applied to it by Chaptal, because of its entering into the composition of nitre, nitric acid and other similar substances. About four-fifths of the volume of the atmosphere is nitrogen, the rest being principally oxygen. Nitre is nearly 13 per cent by weight nitrogen. Nitrogen is inodorous, tasteless and incombustible and is a very inert substance in itself, although many of its compounds, such as nitric acid and ammonia, are possessed of great chemical activity. By reason of its inertness and general slowness of chemical action, it dilutes the oxygen in the atmosphere and serves to moderate the otherwise too violent action of the latter gas. Under certain circumstances nitrogen may be induced to combine with other elements, especially with hydrogen, oxygen, carbon, titanium, tantalum and tungsten. The oxides of nitrogen are five in number. These oxides may be all produced from nitric acid. The *trioxide* forms a dark blue liquid, which, when added to water at 0°, combines therewith, forming *nitrous acid.* This solution acts as a reducing agent, inasmuch as it eliminates gold and mercury as metals from several of their salts; on the other hand, it also exercises an oxidizing action on such salts as ferrous sulphate and potassium iodide. By replacement of the hydrogen in nitrous acid, a series of metallic salts is obtained, called *nitrites.* Nitrogen monoxide or nitrous oxide is better known by the name of "laughing gas" (See LAUGHING GAS).

Nitroglycerine, *ni'tro glis' ur in,* an explosive substance, appearing as a colorless or yellowish, oily liquid, heavier than water. It is insoluble in water, but dissolves in alcohol or ether. It is prepared by adding glycerine to a cooled mixture of sulphuric acid and fuming nitric acid. The liquid is poured into ten or twenty times its bulk of cold water, when the heavy nitroglycerine sinks to the bottom. When violently struck, nitroglycerine explodes. The volume of gas produced is about 10,000 times the initial volume of the nitroglycerine. The explosive force of nitroglycerine compared with that of an equal volume of gunpowder is as thirteen to one, and it is the strongest explosive known. If any traces of acid are allowed to remain in nitroglycerine, it is liable to undergo spontaneous explosion; hence, it is an exceedingly dangerous article to transport or store, and it is advisable to prepare the substance on the spot where it is to be used and only in such quantities as may be required for immediate consumption. This method is adopted in many quarries and engineering undertakings. Nitroglycerine has for some time been extensively used in the manufacture of dynamite and smokeless powder. See BLASTING; DYNAMITE; SMOKELESS POWDER.

Ni'trous Acid. See NITROGEN.

Nitrous Oxide. See LAUGHING GAS.

Nivose, *ne voze',* (snow-month), the name given in the French revolutionary calendar to a winter month, beginning December 21 and ending January 19.

Nix, in German mythology, the name given to water spirits, male or female. The male nixie is sometimes represented as old, sometimes as young, but generally as a malicious being. The female nixie appears as a maiden, who often falls in love with some young man, whom she entices or draws into the water.

Nizhni-Novgorod, *nyeezh'nye nov' go rod,* or **Nijni-Novgorod,** a town of Russia, capital of the government of the same name, at the confluence of the Volga and Oka rivers, 265 mi. e. n. e. of Moscow. The town is divided into three parts, the upper district, including the citadel; the lower portion, and the suburbs, occupied by the great annual fair and containing thousands of stone shops, besides other structures for the accommodation of the fair. This fair, instituted in Nizhni-Novgorod in 1817, is held in the latter part of the summer and attracts an immense multitude of people from all parts of Russia and many parts of Asia. The annual value of the sales is estimated at something over $80,000,000. Population, about 95,000, which is more than doubled at the time of the fair.

No'ah, one of the patriarchs of the Old Testament, son of Lamech, described in the book of *Genesis* as being chosen by God for his piety to be the father of the new race which should people the earth after the deluge. Having been warned by God of the coming flood, he built a vessel (the Ark) according to God's direction, and entered it with his family and all kinds of animals. After the waters had subsided, the Ark rested on Mount Ararat, where Noah gave a thank offering to God and was assured that the earth should never again be destroyed by a flood. As a sign of this promise, God set the rainbow in the clouds. Noah, or the family he represented, lived 350 years after the flood. While modern accounts place Mount Ararat in Armenia, older traditions locate it in the mountains of the Kurds, east of the Tigris.

Nobel Prizes, a series of prizes founded by Alfred Bernard Nobel, a Swedish inventor most widely known for his invention of dynamite (See DYNAMITE). Mr. Nobel bequeathed $9,000,000, the income from which is to be annually distributed in five equal prizes awarded for (1) the most important invention or discovery in physics; (2) the most important discovery or improvement in chemistry; (3) the most important discovery in physiology or medicine; (4) the most remarkable literary work of an idealistic nature; (5) the best work done in the interest of universal peace. The prizes amount to $40,000 each. The first four are awarded by the Swedish Academies, and the fifth by the Norwegian Storthing. The first prizes were awarded in December, 1901. Two Americans have received prizes: President Roosevelt in 1906 for his work in the interest of universal peace, and Professor Albert A. Michelson of the University of Chicago in 1907 for his discoveries in physics.

Nobil'ity, a rank or class of society which possesses hereditary honors and privileges above the rest of the citizens. Such a class is found in the infancy of almost every nation. Its origin may be attributed to military supremacy, to superior ability or to religious precedence.

Among the ancient Romans, the patricians originally formed the nobility; but a new order of nobility arose out of the plebeians, consisting of those who had held curule magistracies and their descendants (See CURULE MAGISTRATES). Among the ancient German tribes, only obscure traces of hereditary nobility are found. The dignities of the counts of the Franks, the aldermen and great *thanes* of England, as also the *jarls* (in England, *eorlas*) of Denmark, were accessible to every one distinguished by merit and favored by fortune. In Venice a nobility grew up consisting of a series of families who gradually acquired all political power and kept it to themselves and their descendants

In England hereditary nobility, that belonging to the titles of duke, marquis, earl, viscount and baron, is now entirely personal, though formerly it was connected with the holding of lands. In Spain and Italy still, the same rank depends in greater measure upon property, and in France and Germany, the *de* and *von* of titles point to the same fact. In these countries, nobility is common to all members of the noble family. and the German nobility form a very exclusive caste. In France and Germany the nobles long formed a class of petty sovereigns within their own domains. The French Revolution first deprived the nobles of that country of their privileges and exclusive rights, and the decree of June 19, 1790, abolished hereditary rank entirely. Under Napoleon I arose a new hereditary nobility, with the titles of princes, dukes, counts, barons and chevaliers, which descended to the eldest sons. After the restoration of the Bourbons (1814) the ancient nobility reclaimed their former rights and privileges. Nobility was again abolished in 1848, but it was restored by Napoleon III. In Norway the Parliament abolished nobility by three successive decrees of 1815, 1818 and 1821.

Node, in astronomy, one of the points in which two great circles of the celestial sphere, such as the ecliptic and the equator, or the orbits of the planets and the ecliptic, intersect each other. The node at which a heavenly body passes or appears to pass to the north of the plane of the orbit, or great circle, with which its own orbit or apparent orbit is compared, is called the *ascending node*; that where it descends to the south is called the *descending node*. At the vernal equinox the sun is in its ascending node; at the autumnal equinox it is in its descending node. The straight line joining the nodes is called the *line of the nodes*. The *lunar nodes* are the points at which the orbit of the moon cuts the ecliptic.

Nogi, *no'ge*, KI-TEU, General Baron (1851–), a Japanese general and administrator, famous for his successful siege of Port Arthur during the Russo-Japanese War, extending from May, 1904, to January 1, 1905. He was a member of the famous Samurai caste of feudal Japan, and after the reorganization of the country he entered the army and won distinction in the Satsuma Rebellion, in which he was twice seriously wounded. After the Japanese-Chinese War of 1895 he was made governor of the island of Formosa, which was ceded by China to Japan as a result of that struggle, and showed remarkable ability as an administrator. At the outbreak of the Russo-Japanese War he was placed in command of the third army and was assigned the task of reducing Port Arthur, considered one of the most strongly fortified ports in the world. After the fall of that fortress he joined Oyama's force and took a conspicuous part in the great Battle of Mukden (See MUKDEN; RUSSO-JAPANESE WAR).

GENERAL NOGI

Nome, a city and mining camp of Alaska, 13 mi. w. of Cape Nome, on the shore of Norton Sound. When gold was discovered on the coast near this point, a town immediately sprang up. At first this was but a city of tents, but as soon as possible a regular city was laid out. At present there exists a municipal government which has fire and police departments, and there are electric light, sewage and telephone systems, public schools, banks, newspaper offices and a theater. Population in 1900, 12,488.

Nonconform'ists, those who refuse to conform to an established church. The name was first applied to those English clergymen who, at the Restoration, refused to subscribe to the Act of Uniformity and were in consequence ejected from their livings. Relief was afforded by the Toleration Act of 1689. The repeal of the Corporation and Test acts in 1828 removed the civil disabilities under which Nonconformists had previously been placed, and religious tests at the universities were abolished in 1871 and 1873.

Nones, *nohnz*, in the Roman calendar, the fifth day of the months January, February, April, June, August, September, November and December, and the seventh day of March, May, July and October. The nones were so called as falling on the *ninth* day before the ides, both days included.

Non-In'tercourse Act. See EMBARGO.

Nordau, *nor'dow*, MAX SIMON (1849–), an Hungarian physician and author, born in Budapest. After traveling in Europe he went to Paris in 1878. Later he wrote several works which received wide attention and were translated into English, but the one upon which his fame rests is known to English readers as *Degeneration*. In this he endeavors to prove that the intellectual activity and excitement of the last half century have resulted in the degeneration of once healthy mental condition into emotional sentimentality and impurity.

Nordenskjöld, *nor'den shöld*, NILS ADOLF ERIK, Baron (1832–1901), a Swedish naturalist and explorer, born in Finland. He devoted himself to science and was appointed to some important posts, but becoming obnoxious to the Russian authorities, he left Finland and settled in Sweden. On a North Polar expedition in 1868, he reached the high latitude of 81° 42′. Having turned his attention to Siberia, he decided, after making two successful voyages through the Kara Sea to the Yenisei, to attempt the accomplishment of the northeast passage, or passage by sea round northern Asia to the Pacific. He sailed in July, 1878, was the first to double the most northern point of the Old World, and after passing through Bering Strait reached Japan in September, 1879. See NORTH POLAR EXPLORATION.

Nordhoff, *nord'hohf*, CHARLES (1830–1901), a celebrated journalist and author, born in Germany. He was educated at Woodward College, Cincinnati, and spent his life in the United States. He was a printer's apprentice in Cincinnati and later served nine years in naval, whaling and fishing service. He then worked in several newspaper offices, did editorial work for Harper's publishing house, the New York *Tribune* and the *Evening Post* and served as Washington correspondent for the New York *Herald*. He visited Hawaii about 1872 and traveled much in California, where he died. His writings deal with politics, philosophy, travel, his experiences at sea (as in *Man-of-War Life* and *Whaling and Fishing*) and with sociology, as in his well-known *Politics for Young Americans* and his valuable book on *The Communistic Societies of the United States*.

Nor'dica, MADAME (1859–), an American prima donna, whose real name is Mrs.

Zoltain F. Dome, born in Farmington, Maine. She received her first musical training at the Boston Conservatory of Music, but later she studied in Italy and London and made her début in 1876. She first appeared in America in 1895, and was at once pronounced an artiste, being regarded as one of the foremost sopranos of modern times.

Norfolk, *nor'fawk,* VA., a city of Norfolk co,. 90 mi. s. e. in a direct line and 116 mi. by water, from Richmond, on the Elizabeth River, opposite Portsmouth, and on the Southern, the Atlantic Coast Line, the Sea Board Air Line, the Norfolk & Western and several other railroads. It is also the terminus of many coastwise and foreign steamship lines and has inland water communication by means of the Dismal Swamp and the Albemarle & Chesapeake canals. Norfolk has an excellent harbor and is the second city in the state and the largest port on the Atlantic, south of Philadelphia. The trade is principally in lumber, coal, grain, cotton, peanuts, oysters, vegetables and fruit. It is the fourth cotton port in the United States and the leading peanut market of the world. The most important industrial establishments are cotton-knitting mills, cotton compresses, fertilizer factories, shipyards, tobacco and cigar factories, foundries, machine shops, lumber mills and silk mills. The city has a splendid system of city schools, besides the Norfolk Academy and the Norfolk Mission College for colored students, and it contains the Saint Vincent's and the Norfolk Protestant hospitals, a public library and a large park. The old Saint Paul's Church, built in 1737, is of historic interest. Other prominent buildings are the customhouse, the city hall, the postoffice, Monticello Hotel, Atlantic Hotel and the Citizens' Bank. The Norfolk navy yard is at Portsmouth. Old Point Comfort is just north of the city.

Norfolk was organized as a town in 1682, was incorporated as a borough in 1736 and was chartered as a city in 1845. In January, 1776, about nine-tenths of the town was burned by the British under the earl of Dunmore (See DUNMORE, JOHN MURRAY). The city suffered severely from yellow fever in 1855. It was entered by Virginia troops in command of William B. Taliaferro, in April, 1861, and the navy yard was fired, but little damage was done. Until taken by the Federal forces, in May of the next year, it was the chief naval station of the Confederacy. Population in 1900, 46,624.

Norfolk Island, an island in the South Pacific, 500 mi. n. w. of New Zealand and 1200 mi. n. e. of Sydney. It is about 5 miles long, and its area is 16 sq. mi. The climate is healthful, and the soil is fertile, and sweet potatoes, various tropical fruits, wheat and maize can be grown. The coasts are precipitous, and there is no good landing place. The highest point in the island is 1040 feet. The Norfolk Island pine grows to a great size, but it is now comparatively scarce. Discovered in 1774 by Captain Cook, the island was long used as a penal settlement connected with New South Wales. It is a dependency of New South Wales. Population in 1901, 870.

Norfolk Island Pine, a tree of the genus auracaria, in the pine family, formerly abounding on Norfolk Island, where it attains a height of 200 feet or more, with a diameter of ten or eleven feet. Its timber is valuable, being white, tough and close-grained. It does not thrive in the open air in our latitude, but it grows remarkably well in conservatories and is one of the most beautiful of trees.

No'ria. See PERSIAN WHEEL.

Normal School, a school organized for the professional training of teachers. In its ordinary meaning a normal school is one devoted to the preparation of teachers for elementary schools. The institutions devoted to training teachers for secondary schools and authorized to grant degrees are termed normal colleges. The first successful normal school was established by Francke, at Rheims, in 1681. A second school established by him in 1704, at Halle, still bears his name (See FRANCKE, AUGUST HERMANN). After this experiment normal schools obtained recognition in France, and in Prussia during the reign of Frederick the Great several of these institutions were established on a firm basis. They are now found in all civilized countries, where they constitute an important part of the system of public instruction. The normal schools of Great Britain are frequently termed teachers' training colleges. The British system has been extended to Australia, Canada and South Africa.

The first school in the United States devoted to the training of teachers was established at Concord, N. H., by Mr. R. S. Hall in 1823. Later, Mr. Hall established similar schools at Andover, Mass., and Plymouth, N. H. The last institution had over 250 students, and for a number of years it supplied teachers for the schools of all the surrounding towns. The first state normal school was established at Lexington, Mass., in 1839, and the schools at Westfield and Bridgewater followed within a year. The establishing of these schools was due to the efforts of Rev. James G. Carter, Mr. Edmund Dwight, who contributed $10,000 for the purpose, on provision that the Massachusetts legislature would appropriate an equal amount, and to Horace Mann, who was secretary of the Massachusetts board of education (See MANN, HORACE). New York, Connecticut, Michigan and Pennsylvania established similar schools within the next twenty years. By 1860 normal schools had become a part of the educational system of a number of states, and after that date the newly organized states and most of the territories provided for normal schools in establishing their systems of public education.

Qualifications for admission, courses of study and grades of work in these schools vary as widely as local conditions. Those in the old states in general have a higher standing for admission and longer and more advanced courses of study, while in the newer states the courses are for two or three years and instruction is confined to the subject-matter and methods of teaching of the common branches, together with such studies as algebra, geometry, the elements of natural science and civil government. Those normal schools which require graduation from a high school or its equivalent, for admission, confine their work almost entirely to professional training, and all normal schools now have teachers' training schools connected with them.

There are a few state institutions for higher professional training, such as the normal college at Albany, N. Y., and the one at Ypsilanti, Mich. Schools of similar grade are also associated with a number of larger universities. The most widely known of these are the Teachers' College of Columbia University, the School of Pedagogy of New York University and the School of Education of the University of Chicago. Chairs of pedagogy are also established in a number of the larger state universities. The demand for trained teachers in large cities has also led to the establishment of city training schools, such as the Normal College in New York City, the Chicago Normal School at Chicago and the Brooklyn Training School in the borough of Brooklyn, N. Y.

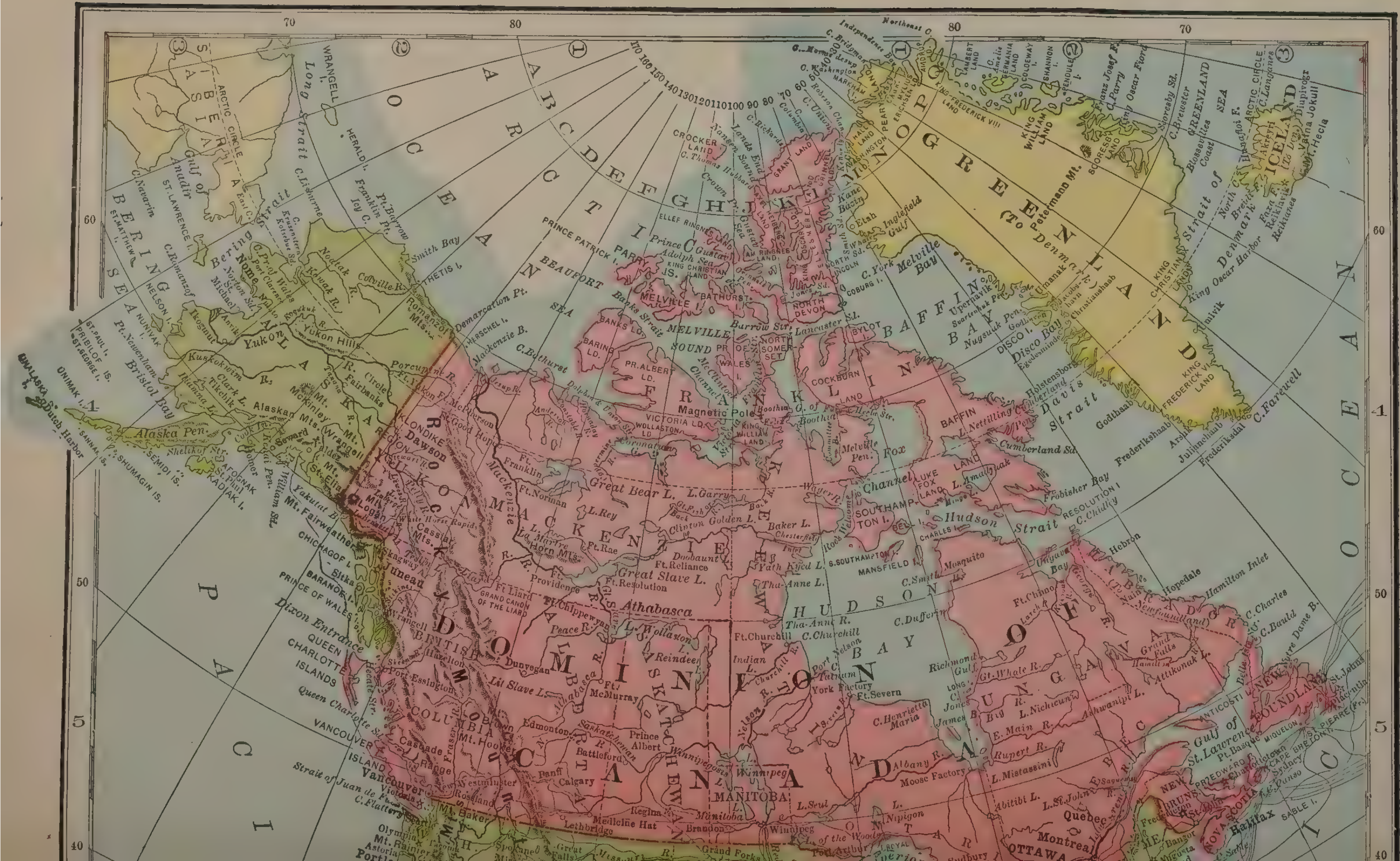
Norman Architecture, the round-arched style of architecture, introduced at the Norman Conquest from France into Britain, where it prevailed till the end of the twelfth century. The more specific characteristics of churches in this style are (1) a cruciform plan, with apse and apsidal chapels, the towers placed one on each side of the façade; (2) semi-cylindrical vaulting; (3) the doorways deeply recessed, with highly decorated moldings; (4) the windows small, with semi-circular arched heads, placed high in the wall; (5) walls frequently decorated by bands of arcades, with single or interlacing arches. In course of time the style assumed a more delicate and refined character, passing gradually into the Early English. Besides ecclesiastical buildings, the Normans built many castles and fortresses, the best remaining specimen of which is the Keep of the Tower of London. The churches at Caen, Normandy, and parts of the cathedrals of Durham, Peterborough, Norwich and Canterbury, in England, afford excellent examples of this style.

Norman Conquest. See WILLIAM I, of England.

Nor′mandy, an ancient province in the north of France, now divided into the departments of Seine-Inférieure, Eure, Calvados, Manche and Orne. On the decline of the Roman Empire this territory was seized by the Franks, and afterwards, in the tenth century, it was wrested from them by the Northmen, or Normans, from whom it received its name. Charles the Simple gave his sanction to the conquest made by the Normans, and Rollo, their chief, received the title of duke of Normandy. William II, duke of Normandy, in 1066 became king of England (See WILLIAM I, of England), and Normandy was annexed to England. On the death of William it was separated from England and was ruled by his son, Robert, but it was afterward again ruled by the kings of England, until Philip Augustus took it from John and united it with France in 1203. Although it was several times retaken by the English, it was finally recovered by the French in 1449–1450. Normandy is one of the richest and most fertile parts of France.

Norman French, a dialect of old French, which, because it was the language of the Normans at the time of the Conquest, became the legal language of England. It continued to be the official speech until the time of Edward III, and it is still used in several formal proceedings of state.

Normans (north men), the descendants of the Northmen who established themselves in Northern France, hence called Normandy. The Danish Northmen invaded England first about


ARCTIC OCEAN
BAFFIN BAY
GREENLAND (To Denmark)
ICELAND
DOMINION OF CANADA
ALASKA
YUKON
MACKENZIE
KEEWATIN
FRANKLIN
UNGAVA
LABRADOR
ALBERTA
SASKATCHEWAN
MANITOBA
ONTARIO
QUEBEC
BRITISH COLUMBIA
NEWFOUNDLAND
NOVA SCOTIA
NEW BRUNSWICK
PRINCE EDWARD I.
HUDSON BAY
Hudson Strait
Davis Strait
Strait of Denmark
GREENLAND SEA
BERING SEA
Bering Strait
Long Strait
BEAUFORT SEA
PACIFIC OCEAN
OCEAN
SIBERIA
ASIA
ARCTIC CIRCLE
Gulf of Anadir
Gulf of St. Lawrence
Bristol Bay
Alaska Pen.
Magnetic Pole
Great Bear L.
Great Slave L.
Athabasca
L. Winnipeg
Winnipegosis
Mackenzie
Yukon
Dawson
KLONDIKE REGION
Juneau
Sitka
Nome
Mt. McKinley
Mt. St. Elias
Mt. Logan
Mt. Fairweather
Alaskan Mts.
Mt. Wrangell
Edmonton
Calgary
Regina
Prince Albert
Battleford
Medicine Hat
Lethbridge
Brandon
Winnipeg
Vancouver
Victoria
Westminster
Quebec
Montreal
OTTAWA
Halifax
St. Johns
Moose Factory
York Factory
Ft. Churchill
Ft. Severn
Ft. Chimo
Hopedale
Hebron
Godthaab
Upernavik
Disco Bay
Melville Bay
Kane Basin
Etah
Robeson Chan.
Smith Sd.
Lancaster Sd.
Barrow Str.
Banks Strait
MELVILLE SOUND
McClintock Channel
Fox Channel
Frobisher Bay
Cumberland Sd.
BAFFIN LAND
COCKBURN LAND
MELVILLE I.
BATHURST I.
NORTH DEVON
BANKS LD.
VICTORIA LD.
WOLLASTON LD.
KING WILLIAM LAND
SOUTHAMPTON I.
WRANGELL I.
HERALD I.
QUEEN CHARLOTTE ISLANDS
VANCOUVER ISLAND
KADIAK I.
AFOGNAK
SHUMAGIN IS.
SEMIDI IS.
UNALASKA I.
Dutch Harbor
ST. LAWRENCE I.
ST. MATTHEW I.
NUNIVAK I.
NELSON I.
PRIBILOF IS.
ST. PAUL I.
ST. GEORGE I.
ONIMAK I.
SANNAK IS.
ANTICOSTI
SABLE I.
C. Farewell
C. York
C. Bathurst
C. Chidley
Pt. Barrow
C. Prince of Wales
Independence Bay
Northeast C.
C. Bridgman
KING FREDERICK VIII LAND
KING CHRISTIAN IX LAND
KING FREDERICK VI LAND
Petermann Mt.
GRANT LAND
GRINNELL LAND
CROCKER LAND
ELLEF RINGNES LAND
PRINCE PATRICK I.
PARRY IS.
Strait of Juan de Fuca
Dixon Entrance
Hecate Str.
Smith Bay
Demarcation Pt.
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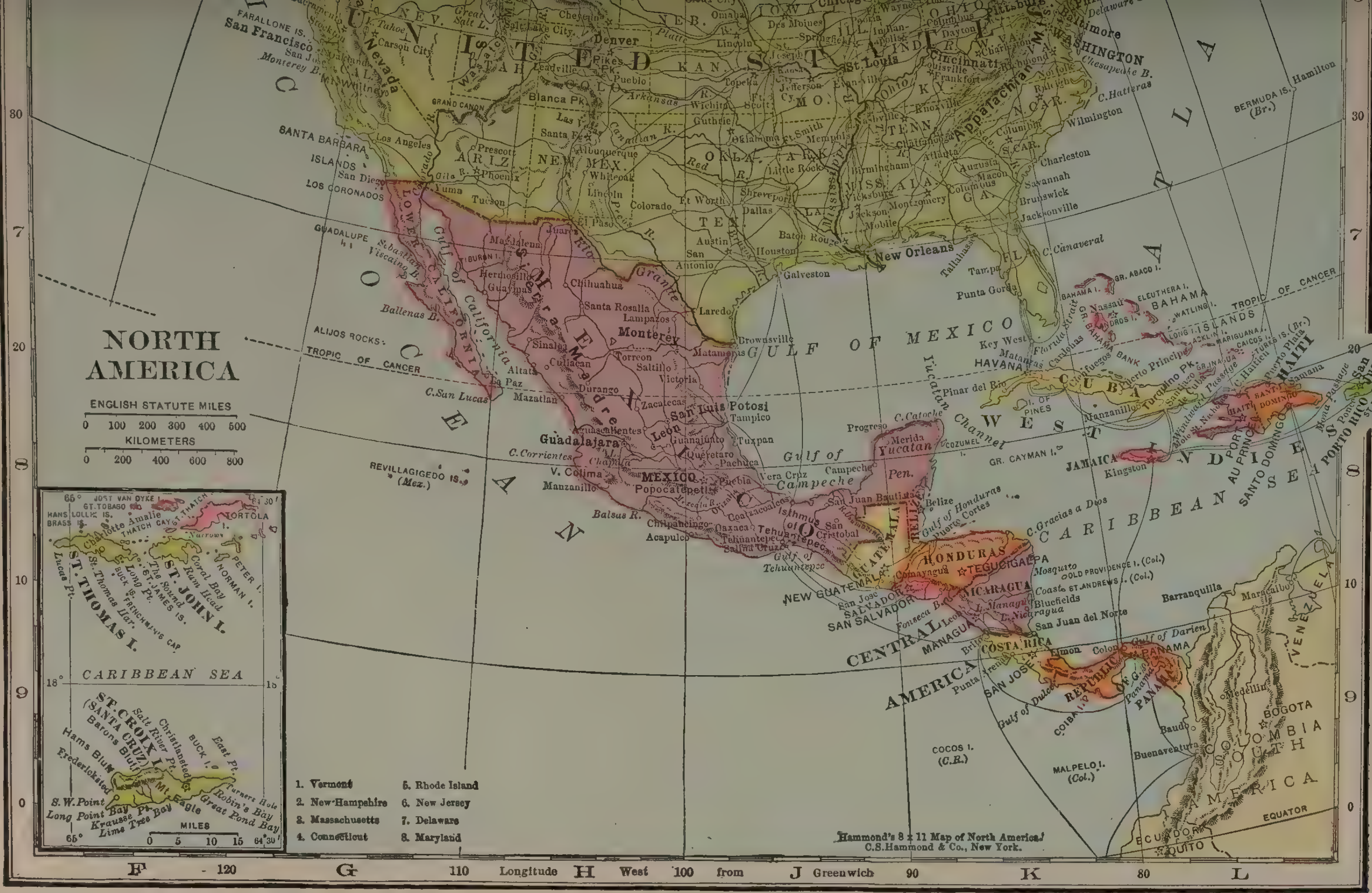


NORTH AMERICA

Hammond's 8 x 11 Map of North America.
C.S. Hammond & Co., New York.

787, and from then there were bitter struggles oft repeated, until the Danish king Sweyn conquered the country in 1032. His son Canute ruled England until 1042, when the Saxons again gained control. William the Conqueror, who finally overthrew the Saxons in 1066, was himself a Norman (See NORTHMEN). Besides the important place occupied in history by the Normans in Normandy and England, bands of Normans established themselves in South Italy and Sicily, and Norman princes ruled there from the middle of the eleventh till the end of the twelfth century.

Norns, in Northern mythology, the three fates, representing the past, present and future. Their decrees could not be changed even by the gods, and they themselves were not regarded as responsible always for their actions. They were represented as three women, the first, old and looking constantly backward; the second, young and gazing straight ahead, the third, heavily veiled, with her head turned in the opposite direction from the first.

Norris, FRANK (1870–1902), an American novelist, author of *The Pit* and *The Octopus.* But for his untimely death he might have taken high rank among American authors, for he showed great promise. The two novels named above were part of the *Epic of the Wheat* that he had planned, to deal in a most vivid and realistic manner with the great problems of the raising and distributing of wheat. Mr. Norris was born in Chicago, was educated in California and at Harvard, studied art in Paris, served as war correspondent in South Africa and in Cuba and was literary adviser to Doubleday, Page & Co. from the establishment of that firm until his death. Among his other stories are *A Deal in Wheat, McTeague, Blix, A Man's Woman* and *Moran of the Lady Letty.*

Nor'ristown, PA., the county-seat of Montgomery co., about 15 mi. n. w. of Philadelphia, on the Schuylkill River and the Schuylkill Canal and on the Philadelphia & Reading, the Pennsylvania and other railroads. The borough has a beautiful location among the hills, in an agricultural and mining section, and it contains extensive manufactures of knitting machines, hosiery, underwear, glass, iron, wire, screws, implements, furniture and other articles. It has a state hospital for the insane, the Charity Hospital, homes for girls and aged women and other charitable institutions. Some of the prominent buildings are the McCann Library, the Masonic Temple, the city hall, the county courthouse and the prison. Montgomery Cemetery contains the tomb of Winfield Scott Hancock. Valley Forge is about six miles to the northwest, and there are other places of historical interest in the vicinity. It was settled about 1688 and was incorporated as a borough in 1812. Population in 1900, 22,265.

North, FREDERICK, Lord, Earl of Guilford (1732–1792), an English statesman who is connected with American history as chief of the British administration during the American Revolution. He became prime minister in 1770 and proved, while honest and well meaning, so subservient to George III that he sometimes carried out a policy of which he did not thoroughly approve. The placing of a duty on tea sold in the American colonies, and the Boston Port Bill were among the measures which he vigorously supported.

North Adams, MASS., a city in Berkshire co., 21 mi. n. of Pittsfield, on the Hoosac River and on the Boston & Maine and the Boston & Albany railroads. It has a beautiful location in the Berkshire Hills, at the foot of Greylock, the highest peak in the state. The Hoosac Tunnel and Hudson Park, with its natural bridge, are special features of interest. The city contains a public library and a state normal school. It has many fine churches, good municipal buildings and a city hospital. There is good water power, and the principal manufactures are cotton, woolen and print goods, boots and shoes, cigars, creamery products and machinery. It was settled in 1765, remained a part of Adams until 1878 and was chartered as a city in 1895. Four villages are now included within its limits. Population in 1905, 22,150.

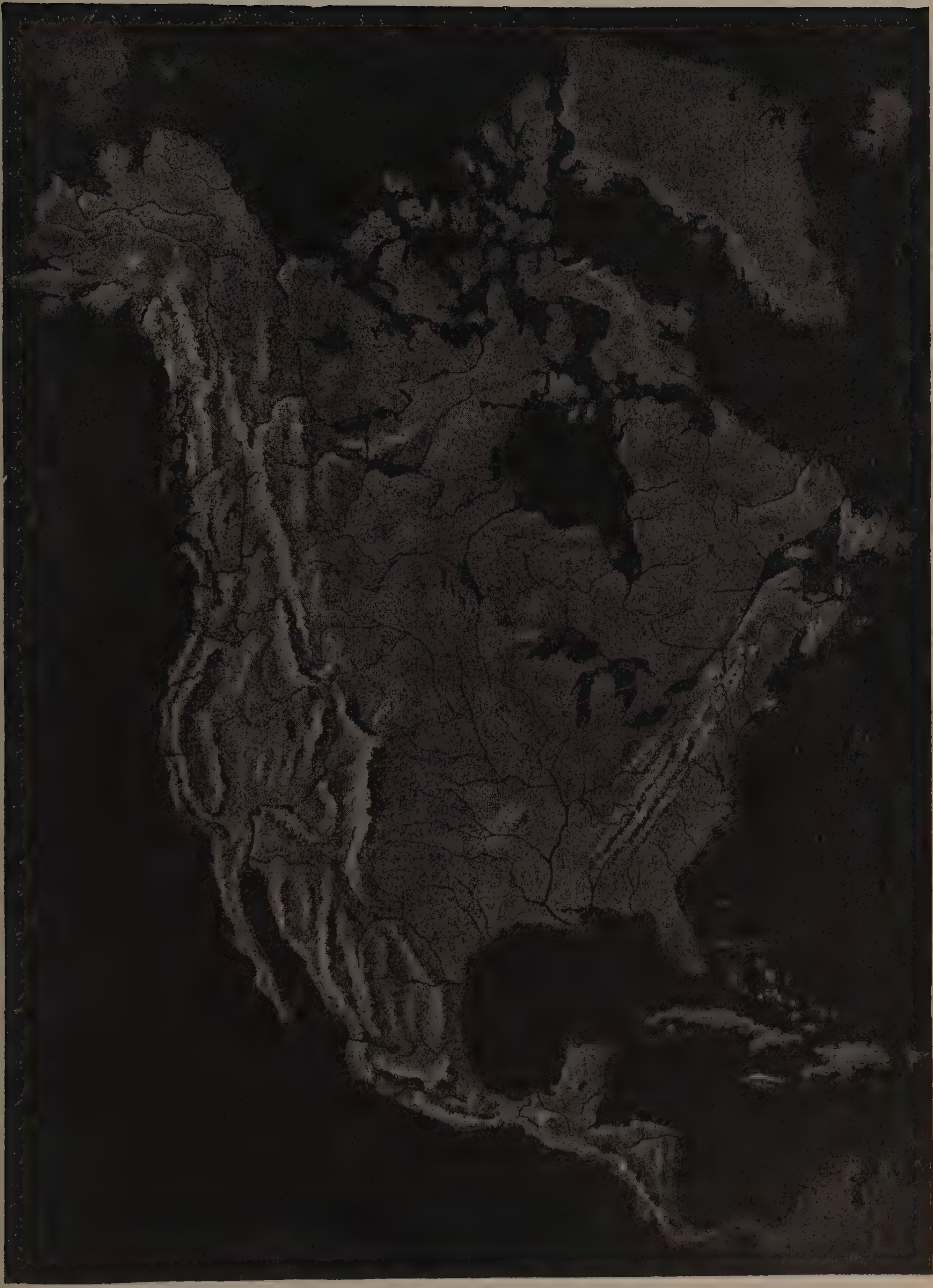
North Amer'ica, the northern division of the American continent and the third largest grand division of the world, extends from 9° to 70° 36′ north latitude and from 47° 30′ to 168° west longitude. Its length from north to south is about 4500 mi., and its greatest breadth from east to west is a little over 3000 mi. The area is 8,300,000 sq. mi. The coast line is quite irregular. The chief projections on the north are Point Barrow, Boothia and Melville peninsulas; on the northeast, Labrador; on the east, Nova Scotia, Florida and Yucatan, and on the west, Lower California and Alaska. The northern and eastern coasts have a number of prominent indentations; on the north is Hudson Bay; on the east, the Gulf of Saint Lawrence, the Bay of Fundy, Delaware Bay, Chesapeake Bay, the Gulf of Mexico and the Gulf of Honduras. On the west, the Gulf of California, San Francisco Bay and Puget Sound are the only indentations of importance. However, all coasts have innumerable smaller indentations, many of which serve as fine harbors. There are numerous islands near the continent and geographically belonging to it. The most noted of these are Greenland, on the north; Newfoundland, the Bermudas, the Bahamas and the West Indies, on the east, and the Queen Charlotte and Aleutian Islands, on the west. Besides these, there are innumerable islands in the Arctic Ocean. They are, however, frozen wastes and of little importance.

SURFACE AND DRAINAGE. North America is divided into three great physiographic regions. These are the Appalachian highland on the east, the Rocky Mountain highland on the west, and the great central plain occupying the vast interior of the continent and extending from the Arctic Ocean to the Gulf of Mexico. The Appalachian highland consists of a low plateau containing several ranges of mountains, which under different names extend from the Gulf of Saint Lawrence in a southwesterly direction to within about 300 miles of the Gulf of Mexico. The elevations in these mountains do not exceed 6700 feet, the height of Mount Mitchell, near the southern extremity of the range. Mount Washington, in the White Mountains, is nearly as high. The eastern slope of these highlands is somewhat abrupt and terminates in the Atlantic plain, which varies in width from 50 miles, in the north, to about 300 miles, in the south. The portion of this plain bordering on the ocean is low, but it is bordered inland by the Piedmont region, which is higher and consists of rolling land terminating in the foothills of the mountains (See PIEDMONT REGION; APPALACHIAN MOUNTAINS). The western slope of the Appalachians is rolling and gradual and terminates in the prairie region of the great central plain.

The Rocky Mountain region extends from Alaska to the Isthmus of Panama, from which point it continues as the Andean system in South America. The name *Cordilleras* is frequently given to this entire mountain system, extending through both of the American continents. The Rocky Mountain highland region consists of a plateau, varying from 3000 to 10,000 feet in altitude and from a width of a few miles, near its southern extremity, to a breadth of over 1000 miles, in Utah and Colorado. Upon this plateau are the various ranges of mountains which make up the Rocky Mountain system. Chief among these are the Rocky Mountains proper, bordering the plateau on the east; the Cascades and Sierra Nevadas, bordering it on the west, and the Sierra Madre, which extend through Mexico. To these might also be added the Coast Ranges, in the United States. The highest elevation of these mountain ranges is found in Mount McKinley in Alaska, the highest point in North America, which has an elevation of 20,464 feet. Other important peaks in this vicinity and nearer the coast are Mount Fairweather, Mount Saint Elias and Mount Logan, each exceeding 18,000 feet in altitude. The system reaches its greatest development where the plateau is widest, in the United States, and bordering this plateau are numerous peaks exceeding 14,000 feet in height. Among the best known of these are Mount Whitney, 14,898 feet; Mount Shasta, 14,380 feet; Pike's Peak, 14,108 feet; Long's Peak, 14,271 feet; Mount of the Holy Cross, 14,006 feet. In Mexico the plateau rises to an altitude of about 7000 feet and is surmounted by a number of lofty peaks, the most noted being Popocatepetl, 17,520, and Orizaba, 18,250 feet. There are also a number of other peaks exceeding 13,000 feet. In the central part of this highland, where the plateau is widest, the mountains enclose a large area known as the Great Basin, whose waters find no outlet to the sea and which contains a number of salt lakes, of which Great Salt Lake is the largest. See ROCKY MOUNTAINS; SIERRA NEVADAS.

The Great Central Plain is divided by the Height of Land, which extends from Cape Charles in an irregular line north of the Great Lakes to the Rocky Mountains and separates the rivers flowing into the Arctic Ocean from those flowing into the Atlantic and the Gulf of Mexico. This Height of Land is a low ridge which originates in the Laurentian Plateau, but it is not marked by any distinct ranges of hills or peaks. To the north of it the land slopes gradually to the north and northeast and is generally low and quite level, in the extreme northern portion being swampy and forming a tundra similar to that in Siberia. The plain to the south is divided by the Mississippi River into two unequal regions, the eastern, well watered and consisting largely of low and level prairie, and the western, which is broad, comparatively arid and rising from the Mississippi gradually to the foothills of the Rocky Mountain plateau.

The river systems of North America consist of the Arctic system, the Atlantic system, the Gulf system, the Pacific system and the inland



RELIEF MAP OF NORTH AMERICA

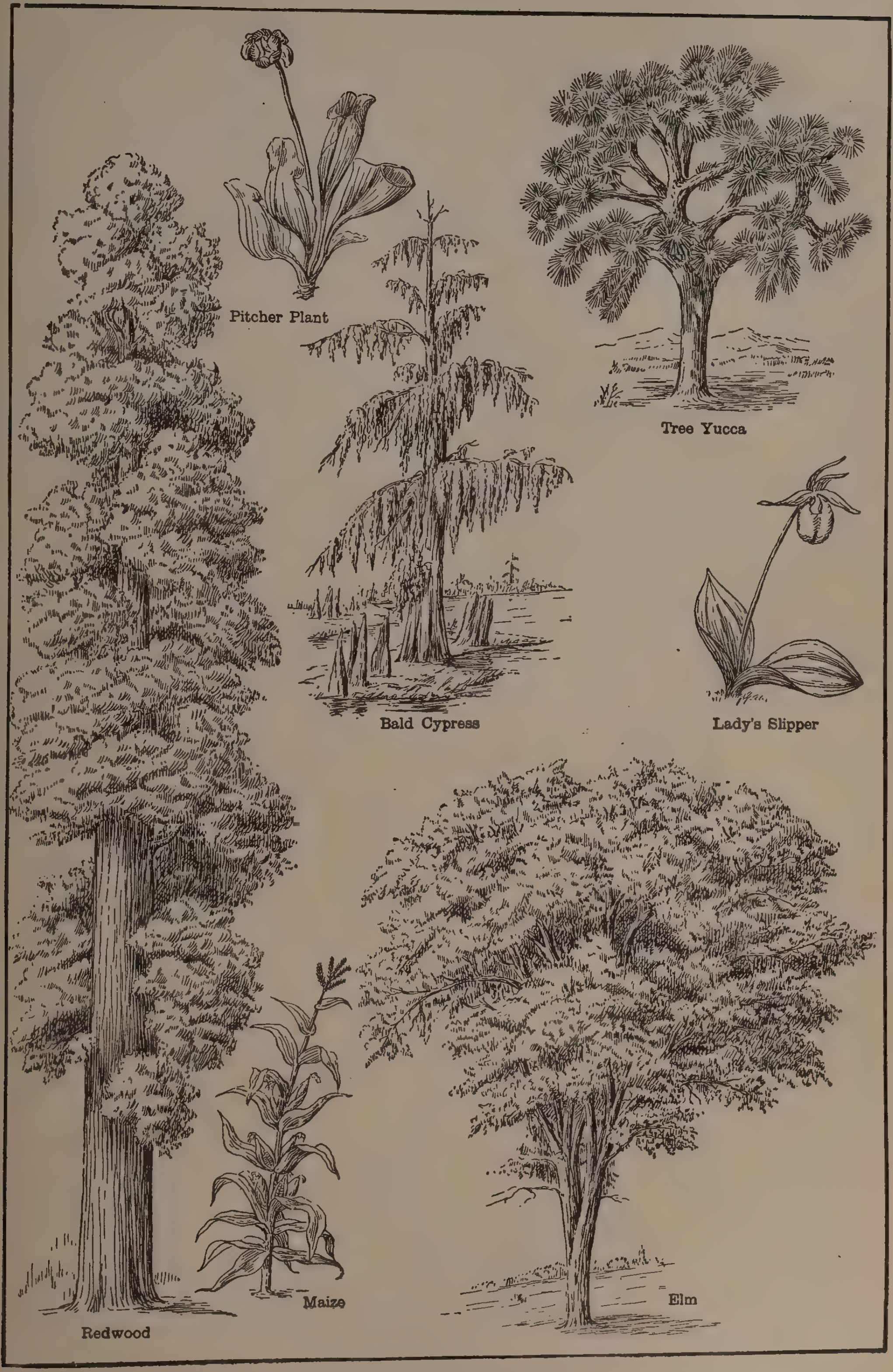
system, draining the great basin. In a detailed description, each of these is susceptible of several divisions. The chief streams in the Arctic system are the Mackenzie, the Saskatchewan and the Nelson, while in the Atlantic system the Saint Lawrence, draining the region of the Great Lakes, occupies first place. Other streams worthy of mention are the Hudson, the Delaware and the Potomac. The Gulf system includes the Mississippi, with all of its tributaries, draining the greater part of that portion of the United States lying between the Appalachian and Rocky Mountain highlands. To this must be added the Rio Grande del Norte, which drains a portion of the plateau west of the Rocky Mountains. The Colorado, flowing into the Gulf of California, occupies a position peculiar to itself and drains the southern portion of the Rocky Mountain plateau. Of the streams flowing directly into the Pacific, the Columbia and the Frazer are the most important, while in the northwest the Yukon, flowing into Bering Sea, is one of the largest and most important rivers in the Arctic regions.

North America contains a larger number of lakes than any other continent. Aside from the Great Lakes, which have an area of more than 90,000 square miles, there are, in the north, Great Bear Lake, Great Slave Lake and Athabasca Lake, each of which is an inland sea; also, Lake Winnipeg, Lake of the Woods and Rainy Lake. In the regions of both the Appalachian and Rocky Mountain highlands are found hundreds of small lakes, some of which have been formed by glacial action, while others occupy the craters of extinct volcanoes. For a more detailed description of surface and drainage see the subhead *Surface and Drainage* in the articles describing each political division of the continent.

Mineral Resources. The eastern half of North America is much the older, and the Laurentian Plateau and the Height of Land constitute the oldest land known. The rocks here are coarse, and their surface has been worn and rounded so that no high elevations are found. South of the Saint Lawrence River and the Great Lakes, these highlands contain valuable deposits of coal and iron, which have been extensively mined in Nova Scotia, Pennsylvania, New York and regions farther south. The coal measures also extend westward into the prairie region, where large areas are found between the Ohio and Mississippi rivers and smaller areas south of the Ohio. In the western part of this plain, and also in certain sections in the Rocky Mountain plateau, are extensive deposits of lignite coal. The Rocky Mountain highland is rich in gold, silver, copper, lead and other minerals, and previous to the discovery of gold in Australia and South Africa, this was the most productive gold region in the world. Large deposits of copper and iron are also found in the vicinity of Lake Superior. Granite, marble, slate and other building stone, as well as clay suitable for brick, tile and pottery, are very generally distributed over the continent.

Climate. North America contains all varieties of climate, from tropical to frigid. The regions bordering upon the Arctic Ocean are so cold that the ground remains frozen throughout the year, but during the short, hot summer it thaws sufficiently on the surface to enable the vegetation of the region to blossom and bear fruit. To the south of this, the climate varies widely between the eastern and western coasts. Owing to the warm winds of the Pacific and the cold winds of the Atlantic, regions having the same latitude on these opposite coasts differ as to their mean annual temperature and amount of moisture. This is well illustrated by the climate of British Columbia and Labrador, the former having a comparatively mild climate, while the latter has winters so severe that it is scarcely inhabitable. In general, places along the Pacific coast have a more equable climate than those along the Atlantic. The great plain in the interior is subject to sudden changes and extremes of heat and cold, because the position of the mountain ranges is such as to allow north and south winds to sweep over it alternately. The rainfall along the Pacific coast is quite heavy, but the high mountains rob the air currents of most of their moisture, so that the region east of the Cascade and Sierra Nevada mountains is arid. The southern part of the central plain receives its moisture largely from the Gulf of Mexico and is well watered, with the exception of its western border, which is too far from the Gulf to receive the benefit of winds from that direction and is so situated in reference to the Rocky Mountains that the westerly winds are deprived of their moisture before reaching it. Thus, an arid region is constituted, which, however, has sufficient moisture to maintain grass and some other species of vegetation. The Atlantic coast is, in general, well watered. The northern portion of this plain is characterized by deep snows during the winter.

Vegetation. In the extreme north, the vegetation consists of reindeer moss and those flower-



PLANTS OF NORTH AMERICA

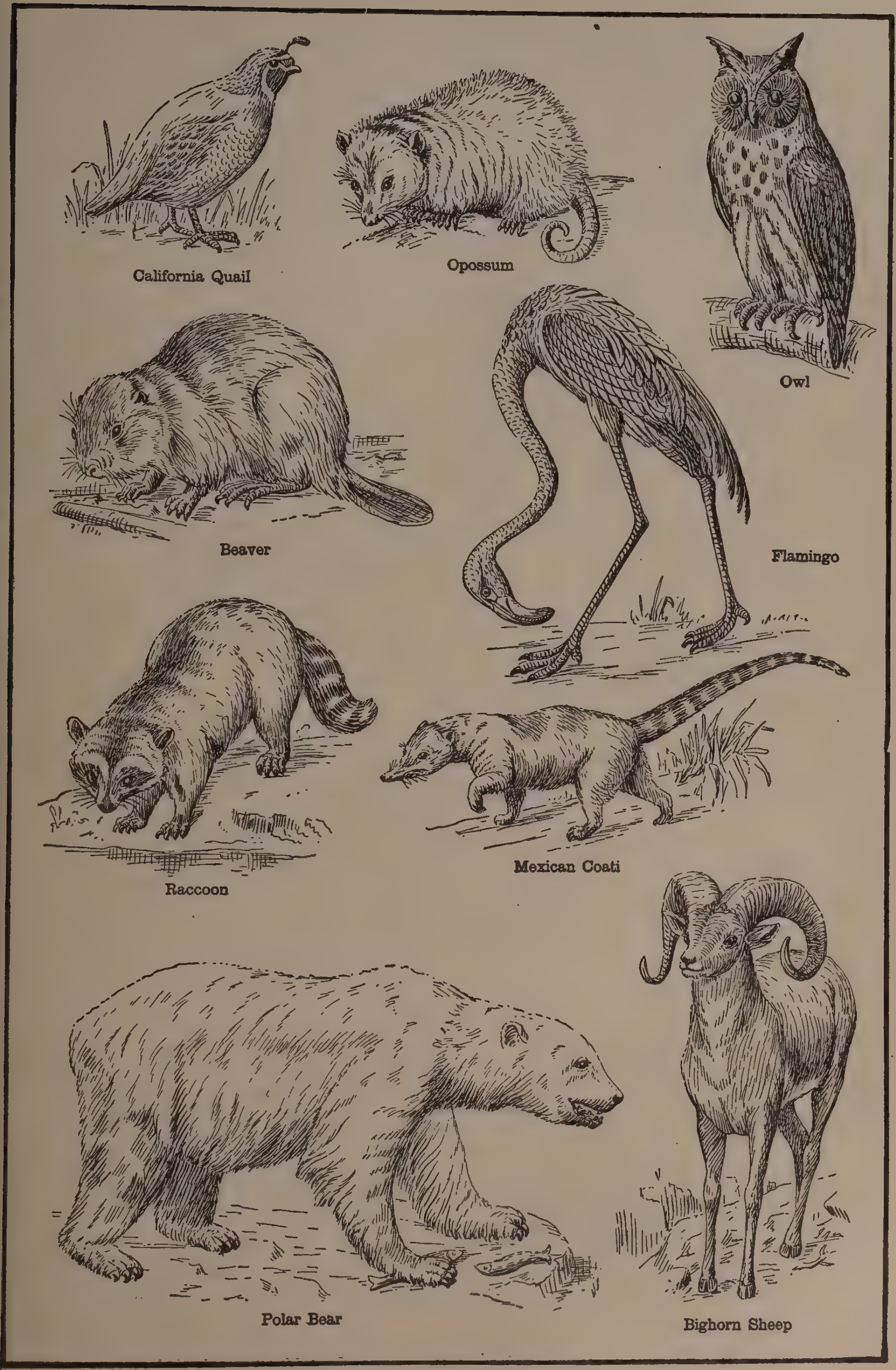
ing plants which mature during the few weeks of the Arctic summer. The southern border of this region is marked by willows and other shrubs. A little southward, forests of cone-bearing trees, spruce, fir, hemlock and pine, are found. These forests extend across the continent from the region south of Hudson Bay to the Pacific coast, thence southward along the Cascade and Sierra Nevada mountains nearly to San Francisco. In the eastern highland, forests of hard wood and pine are found generally distributed as far south as the Gulf and along the Gulf as far west as northeastern Texas and Arkansas. In the south, these forests consist largely of pine and cypress. The northern part of this forest region extends westward as far as the Mississippi River, and in the vicinity of the Great Lakes the extensive pine areas have given rise to a large lumber industry (See FORESTS; LUMBER). In general, the prairie region and the great plains are treeless, except along the banks of streams and around other bodies of water, but originally they were covered with a heavy growth of grass. In the southwestern part of the United States are extensive growths of cactus. For cultivated plants, see the subhead *Agriculture*, under the various articles on political divisions of the continent.

ANIMAL LIFE. When first discovered by white men, North America contained a large number of wild animals, including a wide range of species. In the extreme north all of these are still found, the most important animals of this region being the walrus, the polar bear, the fur seal and the caribou, or American reindeer. The Arctic fox, the beaver, the otter, the marten and other fur-bearing animals are also found in this region. In the southern belt of this region, extending as far south as northern Maine, are found the moose and the deer. In the Rocky Mountain region are found the elk, the deer, the Rocky Mountain sheep and, among carnivorous animals, the wolf, the coati and the black, brown and grizzly bears. Large herds of bison formerly roamed over the central plain, but these animals are now nearly extinct, and only a few herds are found in national and private parks. These plains are also the home of the gopher and the prairie dog. In the Appalachian region are found the fox, the raccoon, the opossum, the mink, the skunk, the lynx, the wild cat and the black bear, while squirrels and other small animals are found throughout the continent. There are many species of birds, ranging from the highly colored toucans, toward the extreme south, to the wild ducks and geese of the north. The most conspicuous of the larger birds are the gull, the falcon, the vulture, the turkey buzzard, the owl, the wild turkey, the crane, the heron, the flamingo, the swan, the wild goose, the duck and the pelican. Among the smaller birds larks, orioles, thrushes, robins, bluebirds, parrots, swallows, blackbirds and grosbeaks are the most familiar. The reptiles are not conspicuous, most of the snakes being harmless. The only venomous species are the rattlesnake, the copperhead and certain varieties of watersnake. The alligator found in the lagoons around the Gulf of Mexico is the largest reptile on the continent. There are thousands of species of insects, including flies, moths, butterflies, bees and beetles. Some of these are noted for their gorgeous hues, but many of them are conspicuous only for their destruction of vegetation.

INHABITANTS. When North America was discovered it was inhabited by a copper-colored race, to whom the name *indians* was given. While this race has become nearly extinct, as civilization on the continent has progressed, remnants of it are still found from the extreme north to the south (See INDIANS, AMERICAN, *color plate*; AZTEC). Among the present inhabitants of North America are found representatives of every European nationality, a large number of people of African descent and a number of Mongolians. In general, in Mexico and Central America people of Spanish descent predominate. The United States contains representatives of every European nation, but those of English descent far outnumber any other. The colored inhabitants of the continent are confined chiefly to the Southern states of the United States, and in the Canadian provinces are found people of English and Scotch descent, while the Province of Quebec is peopled almost entirely by the descendants of the early French colonists.

POLITICAL DIVISIONS. The independent countries of North America, including islands, are the United States, Mexico, Guatemala, Honduras, San Salvador, Nicaragua, Costa Rica, Cuba, San Domingo and Haiti. The colonial possessions are the Dominion of Canada, Newfoundland, Balize, or British Honduras, belonging to Great Britain, and the islands of Saint Pierre and Miquelon, belonging to France.

HISTORY. America was first made known to the world by Christopher Columbus in 1492. The continent of North America was first dis-



California Quail

Opossum

Owl

Beaver

Flamingo

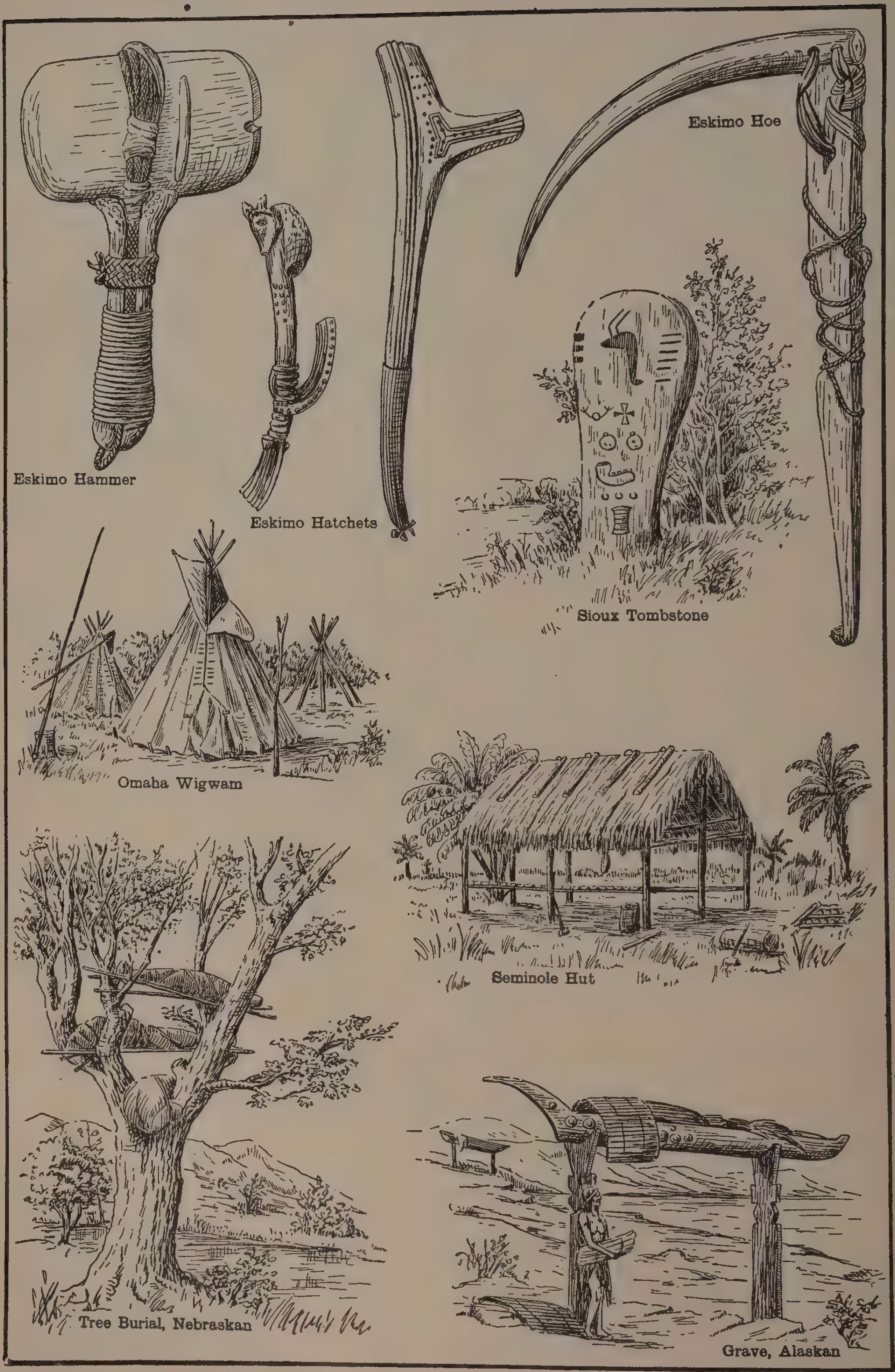
Raccoon

Mexican Coati

Polar Bear

Bighorn Sheep

ANIMALS OF NORTH AMERICA



Eskimo Hammer

Eskimo Hatchets

Eskimo Hoe

Sioux Tombstone

Omaha Wigwam

Seminole Hut

Tree Burial, Nebraskan

Grave, Alaskan

INDIAN IMPLEMENTS AND BUILDINGS

covered by John Cabot in 1497, and the New World was named after Americus Vespuccius, who was the first to write a description of it. During the sixteenth century many voyages of discovery were made by the Spanish, Portuguese, English and French. The Spaniards colonized Mexico and made attempts to settle in what is now the southern part of the United States. The French also made attempts to settle on the coast of the United States and along the Saint Lawrence, but no permanent settlements were established in these regions until the beginning of the seventeenth century, when the English settled in Jamestown, Va., in 1607, and at Plymouth, Mass., in 1620. The French made their first settlement at Quebec in 1608. During the century following, the continent was practically divided among Spain, Great Britain and France, but in 1763, at the close of the French and Indian wars, France ceded her claim to Great Britain, and the continent was divided between Great Britain and Spain. After the American colonies established their independence, by purchase and conquest, the United States obtained possession of the Spanish territory north of Mexico. For detailed history, see subhead *History*, under CANADA, MEXICO and UNITED STATES.

Northamp'ton, the capital of Northamptonshire, England, a market town and Parliamentary borough. It is situated on the Nen, 67 mi. n. w. of London. The most interesting buildings are the Church of Saint Peter, the Church of Saint Sepulchre, the townhall and the corn exchange. The staple manufacture is boots and shoes for home and export trade; the currying of leather is also an extensive industry, and there are iron and brass foundries, breweries and flour mills. Population in 1901, 87,021.

Northampton, MASS., the county-seat of Hampshire co., 17 m. n. of Springfield, on the Connecticut River and on the Boston & Maine and the New York, New Haven & Hartford railroads. Smith College for women is located here. The city has a number of public institutions, including the Clarke Institute for Deaf Mutes, a hospital, Smith Charities, a state insane asylum, a home for aged women, Burnham Classical School for girls, Academy of Music and the public, Forbes and Lilly libraries. There is also here a unique and interesting work of home culture clubs, planned and inaugurated by George W. Cable, for the improvement of the people, using three large buildings for social meetings and educational classes. Other prominent structures are the Academy of Music, the courthouse and the high school building. The city is located on elevated ground, amid beautiful scenery, near Mount Tom and Mount Holyoke. Both of these peaks are ascended by railways and afford magnificent views. The principal manufactures are silk, cutlery, brushes, lumber products, hardware, furniture, hosiery and various other articles. The place was settled by a small company from Springfield in 1654 and was chartered as a city in 1883. Jonathan Edwards was a minister here from 1727 to 1750. Population in 1905, 19,957.

North At'tleboro, MASS., a town in Bristol co., 32 mi. s. w. of Boston, on the New York, New Haven & Hartford railroad. It contains manufactures of jewelry, cotton yarn, silverware, rope and other articles. The town has the Richards Library, a G. A. R. hall and Holmes Memorial Building. It was settled in 1637 and was incorporated in 1887. Population in 1905, including several villages, 7878.

North Brad'dock, PA., a borough in Allegheny co., about 10 mi. e. of Pittsburg, on the Pennsylvania railroad. It is a residence place and contains a large plant for the manufacture of steel rails. The borough was incorporated in 1897. Population in 1900, 6535.

North'bridge, MASS., a town in Worcester co., 10 mi. s. e. of Worcester, on the Mumford and the Blackstone rivers and on the New York, New Haven & Hartford railroad. There are large cotton and woolen mills, machine shops and furniture, cigar and other factories. It was settled in 1662, but remained a part of Mendon until its incorporation in 1772. Population in 1905, including several villages, 7400.

North Cape, a promontory forming, with Knivskjoerodde, the northernmost point of Europe. It is on the north coast of the island of Magero, off the coast of Norway, in latitude 71° 11′ north.

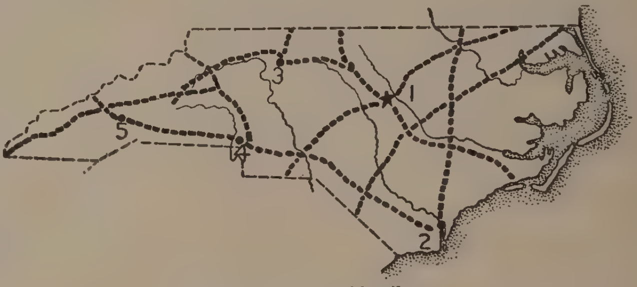
North Car'oli'na, the OLD NORTH STATE, a state of the South Atlantic group, bounded on the n. by Virginia, on the e. by the Atlantic Ocean, on the s. by South Carolina and Georgia and on the w. by Tennessee. The extreme length of the state from east to west is 503 mi.; the average breadth, 100 mi.; the extreme breadth, 187½ mi., and the area 52,286 sq. mi., of which 3670 sq. mi. are water. Population in 1900, 1,893,910, of which 630,207 were colored.

SURFACE AND DRAINAGE. The state is naturally divided into three regions—the low coastal plain, the Piedmont plateau and the highlands.

The first extends inland from 120 to 160 miles and has a surface ranging from sea level to less than 500 feet in altitude; the eastern portion of this consists in many places of lagoons and swamps, of which Pamlico and Albemarle sounds are the most prominent. These shallow indentations are enclosed from the sea by a low bar, which extends along the entire coast, and the chief projections on this bar constitute capes Hatteras and Lookout. The coastal plain has its western border at the Fall Line and is succeeded by the Piedmont plain, or plateau, which occupies a region extending westward until it meets the foothills of the Appalachian mountain system (See PIEDMONT REGION). The Piedmont region varies in altitude from 200 to 1200 feet. The surface is rugged and hilly in the western part, but quite level or undulating in the eastern. This region is separated from the western plateau of the state by the Blue Ridge Mountains. The Great Smoky Mountains form the boundary between North Carolina and Tennessee. This part of the state ranges in elevation from 1000 to 6000 feet. Mitchell Peak, with an altitude of 6711 feet, is the highest point east of the Rocky Mountains. There are a number of other peaks in the vicinity that have altitudes of 6000 feet or more. The region is quite heavily timbered, the valleys between the mountains are threaded by numerous streams, and because of its scenery and salubrious climate this part of the state is a favorite resort, both summer and winter. Numerous waterfalls are objects of interest to tourists.

The part of the state west of the Blue Ridge is drained into the Mississippi through the Hiwassee, the Little Tennessee, the French Broad, the Wautauga, and the New rivers, the largest of which are the Little Tennessee and the French Broad. East of the Blue Ridge the rivers flow directly into the Atlantic or southward into South Carolina and thence to the ocean. Beginning with the west, the important streams, in their order, are the Catawba and the Yadkin, which flow into South Carolina; the Cape Fear, the Neuse, the Tar, the Roanoke and the Chowan, which flow into the Atlantic. The Tar and the Neuse find outlets through Pamlico Sound, and the Roanoke and the Chowan flow into Albemarle Sound. There are no lakes of importance.

CLIMATE. North Carolina lies on the same parallel of latitude as the central Mediterranean basin, but its climate is modified by the proximity of the ocean on the east and the great mountain system on the west. The mean temperature for the state is 59° F. January is the coldest month of the year, but the thermometer rarely registers as low as zero. July is the warmest month, but the temperature is rarely higher than 91°. The rainfall is uniformly distributed throughout the year, the average precipitation being 52 inches. The average snowfall is 5 inches, but snow seldom remains on the ground more than a day or two, except in the mountain section. The storms on the Atlantic coast, especially off Hatteras, are violent and often destructive to shipping.



NORTH CAROLINA

1, Raleigh; 2, Wilmington; 3, Winston Salem; 4, Charlotte; 5, Asheville.

Dotted lines indicate chief railroads.

MINERAL RESOURCES. In the region west of the Blue Ridge, mica and corundum are found in large quantities. This part of the state also contains valuable deposits of iron ore, which are worked to a considerable extent, though their output cannot be compared to that of the Pennsylvania mines or of the Great Lakes. Coal is mined to a limited extent in Chatham County, in the center of the state. Besides these minerals there are large deposits of granite, soapstone, sandstone and brick clay, which is quite widely distributed over the state. The quarrying of granite forms an important industry. Gold has been profitably mined in the state from time to time, and certain localities yield precious stones, such as hiddenite, rubies, emeralds, opals and agates.

FISHERIES. The coast waters abound in fish, and the fisheries give employment to about 12,000 men. In some localities along the coast are extensive oyster beds, while the inhabitants of other regions are engaged chiefly in taking shad and herring, the latter being obtained in large numbers. Diamond-back terrapins and turtles are captured along the coast and exported.

AGRICULTURE. A considerable proportion of the coastal plain is sandy and unproductive, but other parts of it are given to the raising of cotton, as is the southern half of the Piedmont region. Tobacco is extensively grown, and in its production the state is next to Virginia. Among the cereals, corn has the first rank. Some rice is grown on the lowlands, and in certain localities large quantities of vegetables are raised for the northern markets. Grapes and other fruits are cultivated in the upland regions.

MANUFACTURES. The rivers of Piedmont North Carolina furnish an abundance of water power, and the mountain streams give numerous sites for possible mills. Since 1890 manufacturing interests have been rapidly developed. The most important of these is the manufacture of cotton goods, which is widely distributed over the state, factories being located in every section. The state does not produce a sufficient quantity of cotton to supply these mills. The second industry in importance is the manufacture of lumber and timber products. Large areas in the state are covered with hard wood and with long-leaf and white pines. These give opportunity for lumbering and also for transforming the lumber into finishings for interiors, furniture, casings and various other articles. The manufacture of rosin and turpentine is also an important industry. Following the lumber and timber industry in importance is the manufacture of tobacco. This is followed by the making of cottonseed oil and cake, and this, by the manufacture of flour and grist mill products. Other industries of importance are the tanning and curing of leather and the manufacture of fertilizers.

TRANSPORTATION AND COMMERCE. North Carolina has three great railway systems, namely, the Atlantic Coast Line, the Southern and the Seaboard Air Line. There are also a number of individual lines and branches. The total mileage exceeds 3600 miles. The customs districts are Albemarle, Wilmington, Pamlico and Beaufort, and the chief exports are tar, turpentine, rosin, lumber, cotton, tobacco, flour and fish. Wilmington has the best harbor, is the commercial metropolis and has steamship lines to New York, Philadelphia and Baltimore. The Dismal Swamp Canal affords communication between Albemarle Sound and Norfolk, on Chesapeake Bay.

GOVERNMENT. The legislature consists of 50 senators and 120 representatives, all elected for two years. The legislature meets biennially, and the session is limited to sixty days. The executive department consists of a governor, a lieutenant governor, a secretary of state, an auditor, a treasurer, a superintendent of public instruction and an attorney-general, each elected for four years. These officers constitute a council of state, which acts in an advisory relation with the governor. The courts consist of a supreme court, comprising a chief justice and four associates, and a superior court, consisting of twelve judges, one for each judicial district. A superior court is required to hold sessions in each county at least twice a year. Local courts are established in towns and cities by the legislature, according to the needs of the different localities.

EDUCATION. Previous to the Civil War, North Carolina held an advanced position among the Southern states in educational matters, but after the war she was confronted with the problem of providing for a large school population, with her resources nearly destroyed. However, the school fund has gradually increased, and as fast as the resources of the state have admitted, the educational system has been extended and the length of term of the public schools increased. Separate schools are provided for white and colored children. In the larger towns the schools are well graded. The University of North Carolina is at Chapel Hill, the College of Agriculture and Mechanic Arts is at Raleigh. The state normal and industrial college for white women is located at Greensboro. The state has established an agricultural and mechanical college at Greensboro and several normal schools for the colored race. Besides these institutions, there are numerous colleges and secondary schools, supported by various religious denominations and by private enterprise. Among these are Davidson College at Davidson, Trinity College at Durham, Guilford College at Guilford, Wake Forest College at Wake Forest and Red Springs Seminary at Red Springs. Among schools especially designed for colored students are Shaw University at Raleigh, Livingston College at Salisbury and Biddle University at Charlotte.

INSTITUTIONS. A school for the deaf, dumb and blind is located at Raleigh, and one for deaf and dumb white children at Morgantown. There is a Confederate soldiers' home at Raleigh and an orphans' asylum for whites at

Oxford. The hospitals for the insane for whites are at Raleigh and Morgantown, and there is one at Goldsboro for colored patients. The state penitentiary is at Raleigh.

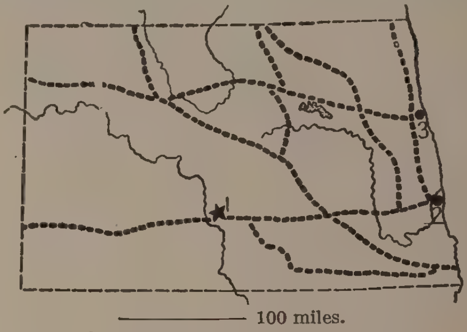
Cities. The chief towns are Raleigh, the capital; Wilmington, Charlotte, Greensboro, Winston Salem and Asheville, each of which is described under its title.

History. North Carolina was first explored by the Raleigh expeditions late in the sixteenth century, but it was first permanently colonized after 1630 by settlers from Virginia. In 1663 it was granted to a group of the king's favorites, whom he named lord proprietors. In 1669 they attempted to establish the so-called *Fundamental Constitutions*, the work of John Locke; but their effort was vain, owing to its cumbersome and unsuitable provisions. In 1728 the proprietors sold their rights to the Crown, and North Carolina and South Carolina, which had been previously united, were governed as separate royal provinces. North Carolina took a prominent part in the struggle against England and was among the first to advise the Declaration of Independence and to adopt an independent constitution. In the war it was the scene of many important engagements.

North Carolina long refused to ratify the Federal Constitution, but it finally added its approval in November, 1789. After the war it steadily prospered, the only serious hindrance being its relations with western settlers, who at one time set up a separate State of Franklin, which was dissolved, but which finally became the State of Tennessee. Though a slave-holding state, North Carolina constantly opposed secession until after Lincoln's first call for troops, when a popular convention passed the resolution, May 20, 1861. Thereafter it furnished double its quota of troops (120,000) and suffered the heaviest losses, both of men and of wealth, throughout the war. The reconstruction contest was fought vigorously in North Carolina, but the state was admitted to the Union in July, 1868. A new constitution was adopted in 1876, and in 1900 it was amended so as practically to exclude negroes from suffrage, by means of educational and property tests. Consult Moore's *History of North Carolina*; *North Carolina and its Resources*, and the pamphlet issued by the state geological survey.

North Carolina, University of, a state university established in 1789 at Chapel Hill and opened for instruction in 1795. The present organization includes a collegiate department, schools of law, medicine, pharmacy, mining and a post-graduate department. The institution is co-educational, but only a small proportion of the students are women. There are about seventy members on the faculty, and there are over 700 students. The library numbers 44,000 volumes, and the annual income is about $78,000.

North Dako'ta, the Flickertail State, one of the North Central states, bounded on the n. by Saskatchewan and Manitoba; on the e. by Minnesota, from which it is separated by the Red River of the North; on the s. by South Dakota, and on the w. by Montana. The extreme length from east to west is 360 mi., and its greatest breadth from north to south, 210 mi.; its area is 74,212 sq. mi. Population in 1905, 437,070.



NORTH DAKOTA

1, Bismarck; 2, Fargo; 3, Grand Forks. Dotted lines indicate chief railroads.

Surface and Drainage. The state belongs to the great central plain. The eastern end, which is a part of the valley of the Red River of the North, is nearly level and has an elevation of from 800 to 1000 feet. This valley expands toward the north, until it reaches a width of 60 miles, near the Canadian boundary. The western edge of the valley rises gradually into rolling prairie, which reaches its greatest elevation in the height of land extending diagonally across the state from the northwest corner, and known as the Plateau du Coteau du Missouri. This plateau divides the state into two nearly equal portions. On its south and west, the surface slopes directly, and in sections quite rapidly, to the Missouri River. That portion of the state west of the plateau is more rolling and broken, in the southeastern part becoming quite abrupt, though it contains no high peaks. The highest land is in the Turtle Mountain region, which is in the north central part of the state and extends across the Canadian boundary.

The portion of the state belonging to the valley of the Red River is drained through this stream ultimately into Hudson Bay. The principal tributaries of the Red River from Dakota are the Sheyenne, which flows southerly, then easterly and enters the main stream north of Fargo, and the Pembina, which rises in Manitoba and enters the Red River a little south of the Canadian boundary. The greater part of the state is drained by the Missouri, although this stream receives no important tributaries from the east. The Yellowstone joins it just after both rivers cross the western boundary, and the other chief tributaries, proceeding southward, are the Little Missouri, the Heart and the Cannon Ball. A portion of the north central part of the state, between Turtle Mountains and the plateau, is drained by the Souris, or Mouse, which enters the state from the Province of Saskatchewan and, after doubling on its course, flows into Manitoba and unites with the Assiniboin. The state contains few lakes. The most important of these is Devil's Lake, northeast of the center. This is a large body of salt water, surrounded by trees and noted as a summer resort.

Climate. The winters are severe, but the dryness of the atmosphere enables man and beast to endure the extreme cold. The snowfall is light, but severe storms (blizzards) from the northwest occur several times during the season. Summer follows winter in quick succession and is characterized by warm, pleasant days, cool nights and severe thunderstorms. The mean annual temperature is 39.4° at Bismarck, 37° at Fargo and 34.4° at Pembina. The mean annual rainfall varies in different sections. At Fargo it is 27.17 inches; at Pembina, 21.91; at Bismarck, 20.10, and at Fort Buford, 13.91 inches.

Mineral Resources. Clays from which excellent brick and pottery are made abound in various localities; building stone is found in the Turtle Mountain region, and the region west of the Missouri is underlaid with extensive deposits of lignite of good quality. This outcrops in many places, so that farmers can mine their own coal. In other localities the mines are worked by corporations. This is the only mining industry of importance in the state. The output is about 200,000 tons annually.

Agriculture. The soil in the eastern half of the state is unusually fertile and of great depth, especially in the valley of the Red River. The climate is especially suited to the raising of spring wheat, and North Dakota has long been known as the leading state in the production of the variety of wheat known as Number 1 Hard, which is the best for the manufacture of flour. Some years the crop in this state exceeds 60,000,000 bushels. This part of Dakota contains the largest farms under cultivation in the United States, some of them exceeding 30,000 acres. The central and western parts of the state are given to general farming and stock raising. Besides wheat, the important crops are flax, oats, barley, corn and potatoes. The rainfall in the western part of the state is scant, but this region is well adapted to grazing, and large numbers of cattle, horses and sheep are raised.

Manufactures. The manufactures are relatively unimportant. The leading industry in this line is the manufacture of flour and other grist mill products. The large quantities of wheat make the operating of flour mills profitable, and numerous small mills are located throughout the wheat-growing region. Considerable butter and cheese are made, and the other manufactures are those which meet the local demands of the people.

Transportation. The Missouri River is navigable through its entire course in North Dakota. The Great Northern and the Northern Pacific railways traverse the state from east to west and have numerous branches extending north and south. The Chicago, Milwaukee & Saint Paul and the Chicago & Northwestern systems also enter the state from the south. In all, North Dakota has over 3200 miles of railway.

Government. The legislature consists of a senate that cannot contain less than 30, or more than 50, members, and a house of representatives that must have not less than 60, nor more than 140, members. The senators are elected for four years, and the representatives for two years. The legislature meets once in two years, and the sessions are limited to sixty days. The executive department consists of the governor, a lieutenant governor, a secretary of state, an auditor, a treasurer, a superintendent of public instruction, a commissioner of insurance, three commissioners of railroads, an attorney-general and a commissioner of agriculture and labor, each elected for two years. The courts consist of a supreme court of three judges, elected for six years, and six district courts, presided over by a judge for each district, elected for four years. Local courts are established in counties and cities.

Education. One-eighteenth of all the lands in the state are reserved for public school purposes, and these, when sold, will create a school fund of more than $50,000,000. In addition to this appropriation, the state has made large appropriations for the state university and state normal schools. The public schools are conducted on the district plan and are under the supervision of a board of education, consisting of the governor, the superintendent of public instruction and the president of the state university. Of this commission, the state superintendent is the executive head. Each county has a county superintendent, responsible for the licensing of teachers and for the conduct of the schools in his county. The state university at Grand Forks is at the head of the public school system. There are state normal schools at Mayville and Valley City, a school of forestry at Bottineau and a scientific school at Wahpeton. The state agricultural college is located at Fargo. The Congregational College at Fargo is also an important institution of collegiate grade.

INSTITUTIONS. The school for the blind is at Bathgate, the institute for the feeble-minded is at Grafton and the school for the deaf and dumb is at Devil's Lake. There are also an industrial school and a school for manual training at Ellendale. There is a soldiers' home at Lisbon; the asylum for the insane is at Jamestown, the state penitentiary is at Bismarck and the state reform school is at Mandan.

CITIES. The chief cities are Bismarck, the capital; Fargo, Grand Forks, Valley City and Mandan, each of which is described under its title.

HISTORY. The territory of Dakota was named after a family of indians and was obtained by the United States through the Louisiana Purchase, in 1803. The first real and permanent white settlement in this territory was probably established by French-Canadian settlers near Pembina in 1807. In 1812 Lord Selkirk, by mistake, built his fort south of the Canadian line. In 1851, a large portion of the territory was opened to white settlement, part being attached to Minnesota Territory and part to Nebraska Territory. Dakota Territory was organized in 1861. Yankton was the capital until 1883, when Bismarck became the seat of government. In 1889 provision was made to admit Dakota into the Union as two states, North Dakota being recognized in November. Since that time its great agricultural resources have given it exceptional prosperity.

North Dakota, UNIVERSITY OF, a state university established at Grand Forks in 1884. It includes a collegiate department, a graduate department, a normal department, a school of mines, a department of military science and a preparatory department. Instruction in business and commerce is also provided for. In addition to the regular work of the university, extension courses are maintained. Women are admitted to all departments and constitute about one-half of the enrollment. Tuition is free to residents of the state. The faculty numbers about sixty, and there are over 500 students. The library contains 10,000 volumes, and the annual income of the institution is about $65,000.

Norther, the name given a cold north wind, which blows over Texas and the Gulf of Mexico. In winter it produces a cold wave and in summer a cool wave. These winds sometimes start as far north as the Northwest Territory in Canada and proceed southward, extending a blanket of cold air over the entire Mississippi Valley. They are usually predicted from twenty-four to thirty-six hours in advance, and warnings of their approach are given by the weather bureau.

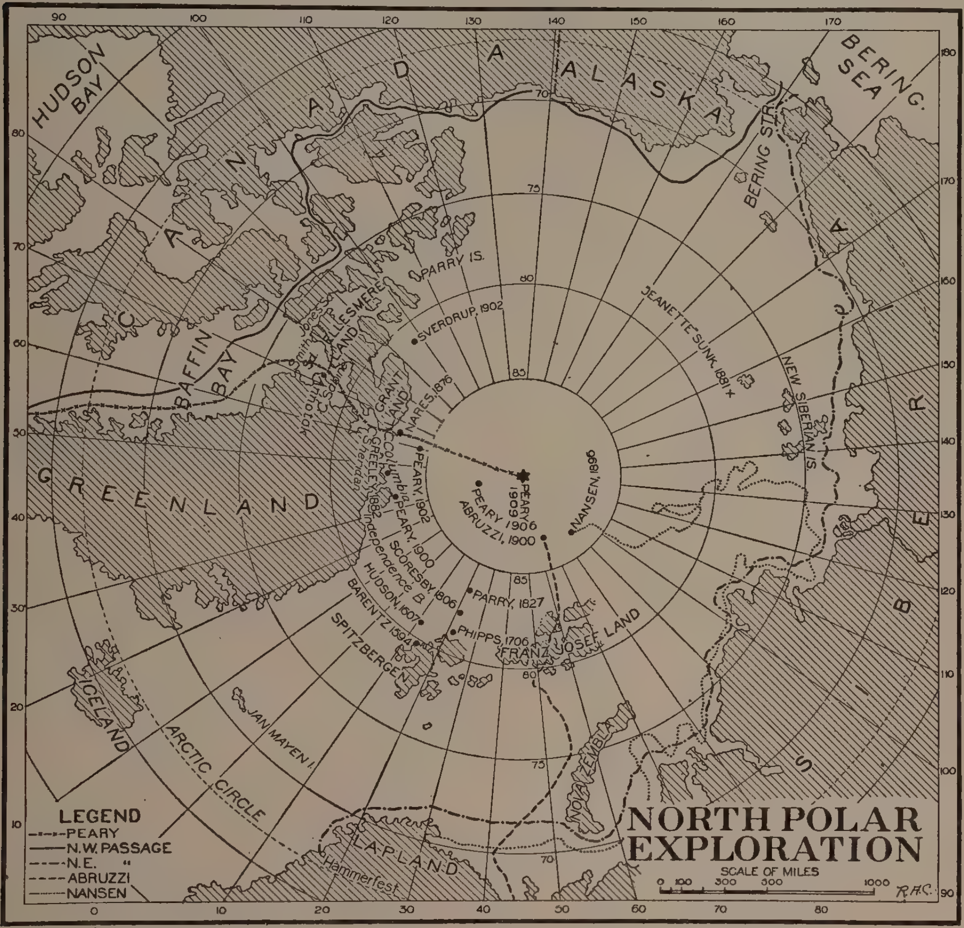
Northern Lights. See AURORA BOREALIS.

North'men or **Norsemen,** a name applied to those bold sea rovers who, in their small, sharp-prowed, open vessels, ravaged Great Britain and other parts of northern and western Europe from the eighth to the eleventh century. They were known to the inhabitants of the British Isles as Danes and Eastmen. They also harried the eastern coasts of the Baltic and the Mediterranean shores and made permanent settlements in the Orkneys, the Hebrides and northern France, where they were called Normans. They left colonies also in the Faroe Islands and in Iceland, whence some of them went to Greenland (982). There is a story that in 1002 the Viking Leif Ericson visited the coast of New England and named it *Vinland* (See NORMANS).

They called themselves *Vikings* and their leaders *sea-kings.* They were a vigorous race, fond of warlike adventure, and worshiped the gods Thor and Odin. The chief causes of their plundering expeditions were, no doubt, the crowded population and scarcity of food in their native homes, as well as their natural love of adventure. See VIKINGS.

North Polar Exploration. On September 5, 1909, Commander Robert E. Peary, of the United States navy, telegraphed from Indian Harbor, "Stars and stripes nailed to the North Pole." A later message announced that Peary reached the Pole April 6, 1909. Five days before Peary's message, Dr. Frederick A. Cook, of Brooklyn, announced that he had reached the Pole April 21, 1908.

Peary's Expedition. Peary's discovery was the crowning achievement of nearly a quarter of a century spent in Arctic exploration. The expedition which resulted in his triumph left New York in the Steamer *Roosevelt* in July, 1908, and reached Etah, the most northerly inhabited point in Greenland, on August 8. Thence the *Roosevelt* went to Cape Sheridan, where it went into winter quarters Sept. 5. The party began the dash for the Pole Feb. 15, 1909, and the destination was reached April 6.



No other expedition for Arctic exploration had been so perfectly organized and completely equipped as this. It embodied the results of Commander Peary's long experience in the Polar regions, and practically provided for every contingency that might arise. While in winter quarters Peary hauled his supplies by sledges to Cape Columbia, from whence the "dash to the Pole" was to start. The expedition left Cape Columbia in six divisions, each a day apart, and at the start the outfit consisted of 7 white men, 19 Eskimos, 140 dogs and 23 sledges. As the march proceeded, these divisions returned to Cape Columbia from time to time until at last only one division remained. During the advance igloos, or Eskimo huts, were built at each camp. These furnished the most desirable shelter for the men, and were in readiness for the party on their return march. With the exception of the drowning of Prof. Marvin of Cornell, the entire expedition returned to the starting point without the loss of a life.

Besides reaching the Pole, the Peary expedition was able to add important data to the information previously gained about the Arctic regions. On his advance march Commander Peary took frequent soundings, and by these showed that the ocean increased in depth soon after leaving Cape Columbia. These soundings show the Arctic Ocean about the Pole to be 12,000 or more feet in depth. This discovery tends to dispel the idea previously current that this was a shallow ocean. It also points to a strong inference that there is no large body of land near the Pole.

Peary's account of the ice shows that in the far north it is more even and less difficult to travel on than near the land. He reports no discovery of life about the Pole, neither did he see any land.

On his other expeditions to the Arctic regions Peary explored and mapped the northern coast of Greenland and made extensive explorations of the Arctic Archipelago. On his return voyage in 1897 he brought from Cape York a meteorite which is the largest of its kind that has ever been discovered. Without doubt he will always rank as the foremost Arctic explorer of his time. (See PEARY, ROREBT E.)

COOK'S EXPEDITION. Dr. Cook accompanied Mr. J. R. Bradley on a hunting expedition to northern Greenland in July, 1907. The boat on which the party sailed was not constructed for navigating the polar seas, so that Cook was obliged to winter at Annotok, a long distance south of Cape Columbia. From Dr. Cook's account it appears that during the winter he transferred his baggage to Ellesmere Land from whence he started for the Pole Feb. 19, 1908. His route was to the west of Peary's and instead of returning by the same route, his return was still further west. The return trip was greatly prolonged by meeting spaces of open water, and the dangerous conditions of the ice, so that Dr. Cook and the few Eskimos who remained with him throughout the journey were compelled to pass the winter of 1908-1909 on the south shores of Jones' Sound. For this reason he was unable to send the news of his discovery at an earlier date. Dr. Cook landed in Copenhagen Sept. 5, 1909, where he was received with high honors by the Danish government and the learned societies of the city. He reached New York later and engaged in a lecture tour throughout a portion of the country. (See COOK, FREDERICK A.)

THE CONTROVERSY. Dr. Cook was unknown as an Arctic explorer, neither was he known to be engaged in an expedition to the Pole. For these reasons his announcement was a great surprise to the world of science, and many geographers and learned societies withheld their acceptance of his statement until his records could be examined by competent authority. Dr. Cook submitted his record to the University of Copenhagen. After a most careful examination his records were not found to substantiate his claims. Commander Peary submitted his records to the National Geographic Society at Washington. The Society approved the records, stating that they fully substantiated Peary's claims to the discovery of the Pole.

HISTORY. Soon after the discovery of the New World, mariners believed that by sailing northward along the coast of North America a passage westward to Asia would be found, which would be much shorter than routes then used. This long-sought route has always been known as the Northwest Passage, and before the middle of the nineteenth century more than two hundred voyages had been attempted for its discovery. The English were the first explorers, beginning with John Cabot in 1497. He was followed by Sebastian Cabot, Frobisher, Davis and others, and in 1806 William Scoresby reached latitude 81° 30′ north and added considerable to the previous knowledge of the coast of Greenland. Among early explorers sent out by the Dutch were Barents, who reached Nova Zembla in 1594, and Hudson, an Englishman acting for a Dutch company, who explored Hudson Bay and surrounding waters in 1609 and 1610.

During the eighteenth century whaling vessels frequented the Arctic regions, and their commanders brought back considerable knowledge of those inhospitable shores. In 1845 an expedition under Sir John Franklin was sent out to discover the Northwest Passage. The entire company perished, and for more than ten years no trace of them was found. The desire to find, and if possible, to relieve Franklin and his followers, led to numerous expeditions conducted by England and the United States.

Among the most celebrated commanders of expeditions for the relief of the Franklin party were Doctor Kane, of the United States, who gave the first popular and systematic account of the polar regions (See KANE, ELISHA KENT), and Hayes, who accompanied Kane and afterward conducted an expedition of his own, reaching latitude 81° 35′ north. He was followed by Hall, who reached latitude 82° 16′ in 1871, but died on his return. In 1875 Nares reached a point north of Grinnell Land, in latitude 83° 20′.

M J MCMASTER.

AN ARCTIC EXPEDITION

During 1882 and 1883 several stations were established by the United States and European nations, coöperating with one another for the purpose of making a scientific study of the magnetic and climatic conditions of the region. The American station, under the command of A. W. Greely of the United States army, was located on the eastern coast of Grinnell Land and Lady Franklin Bay, 81° 44′ north. The station was maintained nearly two years, when the party retreated southward and was rescued in June, 1884. Only 7 of the 32 men survived.

Nordenskjold sailed eastward from Tromso toward Bering Strait. The next season, in 1879, he made the passage and reached Yokohama (See NORDENSKJOLD, ADOLPH ERIC). Lieutenant De Long of the United States navy, in the *Jeannette*, entered the Arctic Ocean through Bering Strait, but his ship was crushed in the ice and sunk in 1881. De Long and his party attempted to escape by moving southward toward the New Siberian Islands. They became separated in a storm and entered the Lena delta by different passages. De Long and most of his followers perished, while the other party, under Commander Melville, survived and reached home in safety. The Norwegian, Nansen, in 1893 sailed northward from Christiania on the *Fram*, a vessel specially constructed for the voyage. In September he was shut in by the ice and began a northward drift, thus utilizing the ocean current which sweeps from Bering Strait and the vicinity of the New Siberian Islands across the pole toward Greenland. See NANSEN, FRIDTJOF.

Another American expedition noted for its elaborate equipment was the Baldwin-Ziegler expedition, which left Tromso, Norway, in July, 1901, for Franz Josef Land. Baldwin established winter quarters on Alger Island, 80° 24′ north, and had stores deposited in other places, also, so that in case his party should be carried out of its course supplies could be reached.

The farthest point reached up to 1906, 86° 30′, was attained by the expedition under the duke of Abruzzi, in 1900. The commander accomplishing this feat was the Italian Cagni, of the Abruzzi party. The Northwest Passage by ship was traversed in 1905 by Captain Roald Amundsen in the sloop *Gjoa*, a small ship of 47 tons, propelled by a gasoline engine. Amundsen entered the Arctic Ocean through Davis Strait, went westward across Lancaster Sound, then southward and followed the coast to Bering Strait.

A few attempts to reach the pole by navigation of the air have been made. Andre, a Swedish engineer, embarked from Spitzbergen in an ordinary balloon in 1897. Nothing was ever heard from him. Walter Wellman of the Chicago *Record-Herald* made several attempts to reach the pole in a dirigible balloon (See FLYING MACHINE), the last one being in 1909. Each attempt resulted in failure.

North'rop, CYRUS (1834–), an American educator. He was born at Ridgefield, Conn., and was educated at Yale. In 1861 he became clerk of the Connecticut house of representatives and two years later of the senate. After this he was made professor of rhetoric and English literature at Yale and held this position until 1884, when he was elected president of the University of Minnesota, which position he filled with great credit.

CYRUS NORTHROP

North Sea or **German Ocean,** a large branch of the Atlantic Ocean, lying between Great Britain and the continent of Europe, with Great Britain and the Orkney and Shetland islands on the west; Denmark and part of Norway on the east; the Strait of Dover and part of France, Belgium, Holland and Germany on the south, and the North Atlantic on the north. Its extreme length is 680 miles; its greatest breadth, 412 miles, and its area, about 200,000 square miles. The North Sea is deepest on the Norwegian side, where the depth is sometimes as great as 1000 feet. The average depth of the southern part is about 100 feet; of the northern part, 400 feet. The fisheries, especially of herring, cod, ling, haddock and flatfish, are exceedingly valuable. The rise and fall of the tide is very great at certain places. Navigation, on account of sand banks, is dangerous.

North Sea Canal (called in Holland the Amsterdam Canal), a great ship canal that connects Amsterdam with the North Sea, running east and west across the narrow neck of land that unites North Holland to the rest of the kingdom.

North Star, the north polar star, the star *a* of the constellation Ursa Minor. It is close to the true pole, never sets, and is therefore of great importance to navigators in the northern hemisphere. See POLE STAR.

North Tonawanda, *ton'a won'da,* N. Y., a city in Niagara co., 10 mi. n. of Buffalo, on the Niagara River, the Tonawanda Creek opposite Tonawanda, the Erie Canal and on the New York Central, the Erie, the Lehigh Valley and several other railroads. It is in an agricultural region and contains lumber yards and extensive manufactures of various lumber products, steam pumps, merry-go-rounds, pig iron, bolts, nuts and pipe. The city has a public library. Population in 1905, 10,157.

Northum'bria, one of the seven Saxon kingdoms of Anglo-Saxon England, founded by Ida, an Anglian chief, in 547. During the eighth century it was the home of Bede, Alcuin and other great scholars. In 827 it became united with the other kingdoms under Egbert.

Northwest'ern University, an institution of higher learning at Evanston and Chicago, Ill., founded in 1851, under the auspices of the Methodist Episcopal Church. It comprises a college of liberal arts and a school of music and oratory at Evanston, and schools of law, medicine, pharmacy and dentistry in Chicago. Three schools of preparatory instruction are maintained by the university, the academy in Evanston, the Grand Prairie Seminary at Onarga and the Elgin Academy at Elgin, Ill. The Garrett Biblical Institute, the Norwegian-Danish Theological School and the Swedish Theological Seminary, all at Evanston, also maintain close relations with the university. The faculty numbers over 300 and the enrollment in all departments is about 4000. The library contains about 80,000 volumes.

Northwesters, the name of warm winds which blow over New Zealand and also over a portion of the Argentine Republic. These winds in the Southern Hemisphere are similar to the Chinook in the United States and are due to similar causes. They take their name from the fact that they come from the northwest. See CHINOOK.

Northwest Ter'rito'ry, a name formerly given to that portion of the territory of the United States roughly included between the Great Lakes, the Ohio River and the Mississippi River, including the present states of Ohio, Indiana, Illinois, Michigan, Wisconsin and part of Minnesota. The larger part of this territory was claimed by Virginia, New York, Massachusetts and Connecticut, by reason of their charters and other grants. These claims long stood in the way of the adoption of the Articles of Confederation, since Maryland insisted that the territory should become a part of the United States before a new government was organized. Congress, therefore, promised in 1780 that the territory, when ceded to the United States, should be formed into new states on an equal footing with all the others, and the various states ceded their claims, Connecticut being the last, in 1786. Each, however, retained a small portion for its own special purposes. In March, 1784, a plan of government was proposed to Congress by Thomas Jefferson and was passed, but was repealed and superseded by the famous Ordinance of 1787 (See ORDINANCE OF 1787). In October of that year General Arthur Saint Clair was appointed governor of the Northwest Territory. In 1800 the western part of the territory was set off as the District of Indiana, with William Henry Harrison as governor, and five years later Michigan Territory was created, with General William Hull as governor. In 1809 Illinois was separated from Indiana, and in 1836 Wisconsin was set off from Michigan and organized into a separate territory.

Nor'ton, CHARLES ELIOT (1827–1908), an American author and art critic, born at Cambridge, Mass., and educated at Harvard University. On completing his education he became connected with a mercantile house in Boston and soon after made a business trip to India and Europe. This ended his business career, and he devoted the remainder of his life to literature and art. From 1864 to 1868 he was, with James Russell Lowell, editor of the *North American Review,* and in 1875 he was appointed professor of the history of art in Harvard University and was made professor emeritus in 1900. Mr. Norton was one of the foremost representatives in America of higher culture, and he wrote and spoke frequently upon his favorite themes of literature and art. He also edited the letters of a number of our prominent literary men, including those of Emerson, Lowell and George William Curtis, also of the English authors Carlyle and Ruskin. Among his published works are *The New Life of Dante, The Divine Comedy of Dante* and *Notes of Travel and Study in Italy.*

Norwalk, *nor′wawk,* CONN., a city in Fairfield co., 14 mi. s. w. of Bridgeport, on the Norwalk River, near Long Island Sound, and on the New York, New Haven & Hartford railroad. It has an attractive location and is a popular residence place and summer resort. Steamships make regular connection with New York City. There is a valuable trade, and the city has extensive oyster beds and various manufactures of wearing apparel, dress goods, locks, air compressors and other articles. The municipality has a Carnegie library, a city hospital, a county children's home and a state armory. It was settled in 1649, was incorporated two years later and was chartered as a city in 1893. Population in 1900, 6125.

Norwalk, OHIO, the county-seat of Huron co., 55 mi. w. by s. of Cleveland, on the Lake Shore & Michigan Southern and the Wheeling & Lake Erie railroads. It is in an agricultural and stock-raising district and contains iron and steel works, piano factories, railroad shops, printing works, machine shops, canneries and other factories. The place was settled in 1817 and was chartered as a city in 1881. Population in 1900, 7074.

Nor′way (Norwegian, *Norge*), a country in the north of Europe, constituting the western part of the Scandinavian peninsula. It extends from latitude 57° 57′ to 71° 11′ 40″ north, and from longitude 4° 45′ to 31° 11′ east. It is bounded on the east by Russian Lapland and Sweden and on all other sides by the sea—on the north by the Arctic Ocean, on the northwest and west by the Atlantic Ocean and the North Sea and on the south by the Skagerrak. Its length is about 1050 mi.; its width, from 20 to 260 mi., and its area, 124,129 sq. mi., or a little more than that of New Mexico. The country is divided into twenty districts, of which the capital, Christiania, forms one, and the city of Bergen, another. Population in 1900, 2,240,032.

SURFACE AND DRAINAGE. The coast of Norway is characterized by its bold, precipitous cliffs, and is remarkable for the fiords which cut into it deeply in all directions. Geologists believe that these fiords are the result of glacial action. Although the length of a line drawn about the outer belt of the rocks of the Norwegian coast would be less than 2000 miles, the total shore line of the country, including that of some of the larger islands, is about 12,000 miles. The surface of Norway is mountainous, particularly in the west and north, but the mountains are not, generally, distinct chains, but huge plateaus or tablelands, from which the peaks rise singly or in groups. The highest point in the country and in the Scandinavian peninsula is the Galdhöppigen, in the Langfjeld Plateau. Immense snow fields and great glaciers descending from the plateaus are among the most distinctive features of Norwegian scenery, and Jostedalsbrä is the largest glacier of Europe.

Owing to the narrowness of the greater part of the country, the rivers of Norway are of no great importance. The few important rivers which Norway can claim as exclusively her own have a southeasterly direction and discharge into the Skagerrak. Of these the chief are the Glommen, with its tributary, the Lougen; the Drammen, and the Skien. The slope of all these rivers is steep, and this renders them unfit for navigation. The most important river in the north is the Tana, which, after forming part of the boundary between Norway and Russia, empties into the Arctic Ocean. Lofty waterfalls are numerous throughout the country, and there are many lakes, most of which, however, are small.

CLIMATE. The climate of Norway is, on the whole, severe, but not unbrokenly so, as might be expected, judging from the fact that for 300 miles the country lies within the Arctic Zone. The great extent of the sea coast and the large amount of water within the country have a noticeable effect on the climate. In the summer the days are long and bright, but the winter days are short, dark and very cold. Almost one-third of the country lies within the famous "Land of the Midnight Sun." On the western coast, where the rainfall is greatest, it amounts to from 70 to 75 inches annually, and at some points it reaches a maximum of 90 to 92 inches. On the southeast coast it is about 48 inches, while on parts of the plateau the average is only 12 inches.

MINERAL RESOURCES. The minerals of Norway are abundant, but as means of transportation are very inadequate in some parts of the country, the mines have never been worked to their utmost. The most important metals are iron, copper, silver, cobalt, chrome and feldspar, the chief mineral product within recent years being copper. Coal is not found to any extent, although deposits have been discovered at a few points on the mainland and on some of the islands.

FISHERIES. The fisheries are of great importance. They include cod, herring, mackerel, salmon, sea trout and lobsters, the cod and herring fisheries being by far the most important. In a single year the catch of the Lofoden cod fisheries has been as high as 35,000,000.

AGRICULTURE. Only about 1000 square miles of the surface of Norway are under cultivation. Oats form the chief cereal crop. Barley ripens as far north as 70° of latitude; oats, to 68°, but wheat does not ripen beyond 64°, and that only in the most favorable seasons. None of the grains are sufficient to supply the needs of the country. Potatoes are grown with success even in the far north. The farms are generally the property of those who cultivate them and commonly include a large stretch of mountain pasture, often 40 or 50 miles from the main farm, to which the cattle are sent for several months in the summer. The rearing of cattle is an extensive and profitable industry. The horses are vigorous and sure-footed, but some of them are of diminutive size. In the north many herds of reindeer are kept, and they constitute the chief wealth of many of the inhabitants of that region. The diary products of Norway are excellent and are exported to some extent.

MANUFACTURES. About one-fifth of the surface of Norway is covered with forest. The greatest forests are of pine, but fine forests of oak are found in the south, and birch forests grow farther north. Timber and lumber constitute about one-third of the total exports of the country. The chief of the manufacturing industries is the production of lumber and wooden ware. The other manufactures include paper making, distilling, shipbuilding and the manufacture of silk, cotton, wool and flax tissues, tobacco, machines and lucifer matches. The importations of manufactured articles are very large.

TRANSPORTATION. The Norwegians are famous as sailors, and the country possesses the largest merchant marine, in proportion to its population, in the world. A large part of the trade consists in the transportation of freight for foreign nations. The imports of the country far exceed the exports, but the revenue from the carrying trade makes up the deficiency. There are only about 1300 miles of railway in operation in the country.

INHABITANTS AND LANGUAGE. The people of Norway are almost all of Scandinavian origin. A small number of Lapps live in the northern part. The country is the most thinly populated of Europe, and during the nineteenth century it lost a larger percentage of its population by emigration to the United States than any other country of Europe, except Ireland. The Norwegian language is practically identical with the Icelandic and the Danish language. The educated classes speak Danish, and this is also the language used in literature.

EDUCATION. Elementary education is free and compulsory, and the primary schools are supplemented by many secondary schools. There is but one university, that of Christiania, which has about 1500 students.

LITERATURE. The producers of the first literature of Norway were the *skalds*, who are known to have composed poetry as early as the ninth century. These oldest *sagas*, while they do not exist in their original form, have in some instances been incorporated in the *Snorra Edda*, and so preserved. The *Elder Edda*, probably composed between the ninth and the eleventh centuries, owed much to Norwegian composers. From the fourteenth century, the date of the union with Denmark, to 1814, the time of the separation from the latter kingdom, Norway had no national literature, its literary history being identical with that of Denmark. As was natural, the first productions after the separation were patriotic songs. The first great national poet was Henrik Wergeland (1808–1845), whose greatest poem is *The English Pilot*. Among others who flourished during the middle of the nineteenth century may be mentioned Johan Sebastian Welhaven (1807–1873), Peter Christen Asbjörnsen and Jörgen Moe. It was Asbjörnsen and Moe who brought to the notice of the world much of the native material contained in the old folk songs and popular poetry. During the last part of the nineteenth century the greatest names in Norwegian literature are those of Ibsen and Björnson (See IBSEN, HENRIK; BJÖRNSON, BJÖRNSTJERNE).

GOVERNMENT AND RELIGION. The government of Norway is a constitutional monarchy. From the early nineteenth century until the twentieth century, the country was united with

Sweden. (For the separation of the two countries, see subhead *History*, in this article.) The legislative power is vested in a parliament, or *Storthing,* which is elected every three years. The Storthing divides itself into two chambers, the *Lagthing,* consisting of one-fourth of the members, and the *Odelsthing.* All bills must originate in the latter chamber. Universal suffrage exists. There are no titles of nobility under the Norwegian government.

The great body of the people are of the Lutheran religion, which is the national Church. Other sects are tolerated, although government offices are open only to members of the established Church.

CITIES. The chief cities of Norway are Christiania, the capital; Bergen, Trondhjem, Stavanger and Drammen.

HISTORY. It is not until the ninth century that the historical period in Norway begins. In 872 the numerous small kingdoms, which had been divided and ruled over by the petty chiefs, or *jarls,* were united under Harold I. During this century and that which followed Viking expeditions were common, and through intercourse with more civilized parts of Europe, Norway received Christianity. The country reached its height as an independent power under Haakon the Old (1217–1263), and it was during this century, too, that permanent colonies in Iceland and Greenland were founded by Norse adventurers. The grandson of Haakon the Old, who died in 1319, was the last Norwegian king of Norway. Magnus Smek was at his accession king of Norway and Sweden, but in 1355 Norway became nominally independent, with Haakon VI, son of Magnus, as ruler. Haakon married the Danish princess Margaret, who on the death of her husband and son became ruler of both Norway and Denmark (See MARGARET). In 1397, by the Union of Kalmar, Margaret brought Sweden also under her sovereignty.

Sweden became independent in the sixteenth century, but Denmark and Norway remained under one rule until 1814. Norway declined in prosperity and importance after the middle of the fourteenth century, when the Black Death ravaged the country and greatly reduced the population. The union with Denmark, too, was far from beneficial to the country, as the kings regarded Denmark as the more important country and treated Norway merely as a province. The long union with Denmark was ended by the Napoleonic struggle, for Sweden demanded, as the price of her aid to the allies against Napoleon, Norway, which was taken from Denmark as a punishment for the adherence of the latter kingdom to Napoleon. The Norwegians refused, however, to agree to the Treaty of Kiel (January, 1814), which ceded the country to Sweden, declared their independence and adopted a free constitution. Bernadotte, the crown prince of Sweden, entered Norway with an army, and although he was not completely successful, the pressure which the other powers brought to bear compelled Norway to accept the Swedish proposals for union, by which Norway was allowed to retain her own constitution. Throughout the nineteenth century, Norway constantly resisted all attempts of Sweden to lessen in any way her constitutional rights. The feeling that Sweden, as the larger country, was in every way considered more than Norway, kept dissatisfaction alive throughout the country, and when, in 1905, King Oscar of Sweden refused the demand of the Storthing, the Norwegian parliament, for a separate consular service, this refusal was made the occasion for declaring the independence of the country. As a proof that the separation was a friendly one, the Storthing invited King Oscar to name one of his sons as king of Norway. Sweden was obliged to submit to the separation, which was arranged in the Treaty of Karlstad, concluded in September, 1905, but Oscar refused to accept the crown for his son, and Charles, the son of the Danish crown prince, the present king of Denmark, was chosen ruler. At his accession he took the name of Haakon VII (See HAAKON).

Consult Maturin M. Ballou's *Due North: or Glimpses of Scandinavia and Russia.*

Norwich, *nor′rich* or *nor′rij,* a city of England, situated on the Wensum River, 98 mi. n. n. e. of London. It is noted for its many old buildings, a number of which were constructed during the Middle Ages, and some of the ancient gates and fortifications are still retained. In the center of the city is an old Norman castle, built at about the close of the eleventh century. There is also a cathedral, noted for its great age and lofty spire, one of the highest in England. Years ago Norwich became the center of an important textile industry, which has continued until the present time. There are also manufactures of agricultural implements, machinery, shoes, mustard and starch. Brewing, dyeing and distilling are of considerable importance. Population in 1901, 111,733.

Norwich, Conn., one of the county-seats of New London co., 50 mi. s. e. of Hartford, on the Thames River, at the head of navigation, and on the Central Vermont and the New York, New Haven & Hartford railroads. The city is picturesquely located among the hills and has many fine residences, well-shaded streets and several public parks. It has excellent water power and contains extensive manufactories of firearms, cotton, silk and woolen goods, stoves, furniture and a large variety of machinery. There is also a valuable trade in lumber, coal, groceries, dry goods and other articles. The city has the Backus Hospital, the Otis Library, a Y. M. C. A. building and the Free Academy, which is well equipped and endowed. Saint Patrick's church and the courthouse are also notable structures. The place was settled in 1659 and was chartered as a city in 1784. Population in 1900, 17,251.

Norwich, N. Y., the county-seat of Chenango co., 45 mi. s. w. of Utica, on the Chenango River and on the Delaware, Lackawanna & Western and the New York, Ontario & Western railroads. It is in an agricultural district and contains stone quarries, blast furnaces, railroad shops, ribbon and glove factories, creameries and manufactories of drugs and other articles. The village has many fine residences, a hospital and a public library. The municipal building and the Lackawanna depot are also prominent structures. Population in 1905, 7115.

Nor'wood, Mass., a town in Norfolk co., 12 mi. s. w. of Boston, on the New York, New Haven & Hartford railroad. It contains a large printing establishment, railroad shops, a foundry, several tanneries and other factories. The town has the Morrill Library, with 7000 volumes. Population in 1905, 6731.

Norwood, Ohio, a city in Hamilton co., adjoining Cincinnati on the northeast, on the Baltimore & Ohio Southwestern, the Norfolk & Western and other railroads. It is a residence suburb of Cincinnati and has a beautiful location. There are also manufacturing establishments, which produce playing cards, bookcases, electrical apparatus, pianos, machinery, tools and other articles. The place was settled about 1790 and was incorporated as a city in 1902. Population in 1900, 6480.

Nose, that part of the respiratory apparatus through which the air enters the lungs; also, the organ of smell. In most animals, the nose is the most prominent feature of the face. In some of the lower animals, as the dog, it forms the muzzle, and in others, like the hog, tapir and elephant, it is prolonged into a proboscis.

The nose in man is a triangular pyramid, with a framework of bone and cartilage. The bony portion of the framework consists of the nasal bones, the vomer and the turbinate bone (See Skeleton, subhead *Skull*). The cartilage is attached to the vomer, completing the partition between the nostrils, and to the nasal bones, completing the framework at the sides. The nose contains front and back passages, known as the *nares*. The front pair form the *nostrils*, through which the air enters. These passages are lined with a mucous membrane, in which, in the upper part of the nostrils, the fibers of the *olfactory nerve* are distributed. These fibers, as well as numerous blood vessels, pass through small openings on each side of the ethnoid bone. See Smell.

Nosology, *no sol'o jy.* See Medicine.

No'tary Pub'lic, an officer authorized to attest or certify legal documents. In the United States, notaries are appointed by the governors of the states, and their jurisdiction extends only to the limits of the particular division for which they are appointed. Any male citizen is eligible to appointment, but some states compel notaries to give bonds for faithful performance of their duties. Usually a notary's seal must be affixed to important legal instruments. A notary may acknowledge legal documents, as deeds or mortgages; may take depositions of evidence, and in some states may exercise the powers of a justice of the peace. The notary is disqualified from acting in any matter in which his own interests are involved.

Nota'tion and Nu'mera'tion. See Arithmetic; Algebra.

Notes, in commerce. See Promissory Note; Negotiable Instruments.

Notre Dame, *no'tr' dam,* Cathedral of, the cathedral of Paris, one of the most famous in France, built during the thirteenth century. It is situated on the Seine River and is in simple Gothic style. There are two massive towers on the west front, and the roof is supported by heavy flying buttresses. During the French Revolution Notre Dame was converted into a Temple of Reason, and the statue of the Virgin gave way to the goddess of reason.

Notre Dame, University of, a Roman Catholic school of collegiate degree, established at Notre Dame, Ind., in 1842. The school maintains thirteen collegiate courses, and also courses in art and music. The institution is particularly well equipped for work in applied science, and its science building and furnishings are valued at $500,000. There are several schools for brothers, novices and young priests, affiliated with the university. It also has several preparatory schools in different parts of the country. The faculty numbers over sixty, and the enrollment is about 1000. The library contains 56,000 volumes, and the buildings and grounds are valued at over $2,000,000.

Nottingham, *not'ting am,* a city of England, located in the County of Nottingham, on the Trent, 108 mi. n. by w. of London. The city is well built, with broad streets and good market places. The most important buildings are the Nottingham castle, which is now an important art museum, the exchange, the postoffice and the townhall. The most noted churches are the Church of Saint Mary, the Church of Saint Peter and the Roman Catholic cathedral. The city is the seat of Nottingham University College. It also contains a mechanics' institute and school of art and has a public library of over 100,000 volumes. The chief industry is the manufacture of lace. Other industries include the spinning of wool, cotton and silk, the manufacture of hosiery, chemicals, foundry products and machinery. The county is celebrated in literature as the scene of the adventures of Robin Hood. Population of the city in 1901, 239,743.

Noun, *nown,* in grammar, a word that names any object about which a statement can be made. A noun is called *proper* when it is the name of an individual person or thing; *common,* when it is the name of a class of objects; *collective,* when in the singular it names a collection of similar objects; *concrete,* when it names material objects; *abstract,* when it names a quality, condition or action.

Nova Scotia, *no'va sko'sha,* a province of the Dominion of Canada, consisting of the peninsula of Nova Scotia and the island of Cape Breton, which is separated from the peninsula by the Gut of Canso. Nova Scotia is bounded on the n. by Northumberland Strait; on the n. e. by the Gut of Canso; on the s. e. and s. w. by the Atlantic Ocean, and on the n. w. by the Bay of Fundy and New Brunswick. The peninsula has a length of about 280 mi., and in width it varies from 50 to 100 mi. The area of the province is 21,068 sq. mi., or about the same as that of Maryland and Massachusetts combined. The coast has numerous indentations, which form excellent harbors.

Surface and Drainage. In general, Nova Scotia consists of low land, sloping gradually to the southwest. Along the shore of the Bay of Fundy are the North Mountains, which extend with slight interruptions across the peninsula from the southwest to the northeast. On the north of the Basin of Minas these are known as the Cobequid Mountains or Hills. They are a continuation of the Appalachian system, but do not here reach a great altitude, nowhere exceeding 1000 feet.

The Annapolis River flows southwesterly in the valley between the North and South Mountains and drains the southwestern part of the province. Other portions are drained by short streams, which are unimportant. The southern and east central portions contain a number of lakes, some of which are mere arms of the sea, nearly enclosed by land. The most important lake in the peninsula proper is Rossignol, in the southern portion. In the south central part of Cape Breton Island is Bras d'Or Lake, which is really an arm of the sea. See Cape Breton.

Climate. Being nearly surrounded by water, Nova Scotia has fewer sudden changes and extremes of temperature than New Brunswick, but it is subject to heavy fogs. The winters are not intensely cold, and the summers are mild and equable, the highest temperature at Halifax seldom exceeding 86°. The annual rainfall is about 45 inches.

Mineral Resources. Nova Scotia contains some of the most valuable coal deposits in North America, and these are extensively worked, the annual output amounting to over 3,000,000 tons. The coal is exported to the other Canadian provinces and to the New England states. There are also large deposits of iron ore and deposits of manganese and gypsum on Cape Breton, while antimony is found in the vicinity of Halifax. As yet none of these resources has been extensively developed, but the presence of iron ore, coal and limestone constitutes a condition favorable for the manufacture of iron and steel.

Agriculture. The lowlands along the streams are specially fertile, and the equable climate and abundant moisture adapt Nova Scotia to the raising of hay, grains, root crops and fruit, all of which are produced in large quantities. Formerly the province was covered with forests, and wherever these have been cleared away the land is tilled. Among the cereals, oats, barley and wheat are the most important. Potatoes are extensively grown, as are root crops. The river valleys in the southern half of the peninsula are specially well suited to the raising of fruit, and apples are grown and exported from this region in large quantities. Stock raising is also an important branch of industry, and considerable butter and cheese are made.

OTHER INDUSTRIES. The fisheries are among the most important resources of the province, and they give employment to a large number of people. The annual output is valued at from $7,000,000 to $8,000,000, making Nova Scotia second only to Massachusetts in the value of her fishing industries. Cod, halibut and lobsters are taken in the largest numbers.

The manufactures are not important. Some coke is made, and on the island of Cape Breton there are iron and steel works. Lumber is manufactured in some regions, and the tanning industry is of some importance. The other industries worthy of mention are the manufacture of cotton goods, the canning of fruit and the manufacture of sugar.

TRANSPORTATION. Its extensive coast line and numerous harbors give Nova Scotia excellent facilities for communication by sea. Halifax is its most important seaport and has regular steamship connection with European ports, as well as with those of Canada and the United States. The Inter-Colonial railway extends the length of the province and has terminal stations at Halifax, Shelburne and Louisberg, so that most of the counties have direct railway communication.

GOVERNMENT AND RELIGION. The province has a legislature consisting of a council and a house of assembly, and the executive authority is vested in a lieutenant governor, appointed by the governor-general of Canada. For local administration the province is divided into counties, and these are divided into towns.

The inhabitants are largely of English, Scotch and Irish descent. The Protestant denominations, including Presbyterians, Baptists, Episcopalians and Methodists, all have large followings. About one-third of the inhabitants are communicants of the Roman Catholic Church.

EDUCATION. The public schools are in charge of a council of public instruction, which comprises the members of the governor's executive council, and the superintendent of education is the chief executive officer. The schools are undenominational and uniform throughout the province as to grading and courses of study. Each county has an academy, and there is a normal school for the training of teachers. There is no provincial university, but there are a number of colleges, maintained by the different religious denominations.

CITIES. The chief cities are Halifax, the capital; Sidney, on Cape Breton; Yarmouth, Picton and New Glasgow.

HISTORY. Nova Scotia was first visited by Cabot in 1497, but it was not colonized by Europeans till 1604, when French settlements were made at Port Royal, Saint Croix and other places. Under the French, Nova Scotia, with New Brunswick, was known as *Acadia*, or *Acadie*. The French colonists were more than once almost entirely driven out by the English. In 1654 Cromwell took possession of the country, which remained with the English till 1667, when it was ceded to France; but in 1713 the country was again ceded to England. In 1755 almost all the French colonists were forced to leave the country, owing to their hostility to the English. In 1763 the island of Cape Breton was annexed to Nova Scotia, but it was separated between 1784 and 1820. In 1784 New Brunswick was detached. In 1867 the province became a member of the Dominion of Canada. Population in 1901, 459,116.

No'va Zem'bla, two large islands in the Arctic Ocean, belonging to Russia and lying north of the northeastern corner of European Russia. The two are separated from each other by the Strait of Matotchkin Shar and from the mainland of Russia by Kara Strait. The total area of the two islands is about 35,150 square miles. The coasts swarm with seals, fish and water fowl. The interior is covered with stunted shrubs, short grass and moss, and the animals include bears, wolves, foxes, reindeer, ermines and other fur-bearing animals. The islands are almost uninhabited, but Russian hunters and fishers visit them constantly.

Nov'el, a prose narrative that has a definite plot and involves portraitures of character and descriptions of scenery. In this broad sense the term includes the *romance*, but in general it may be said that the romance is to be distinguished from the novel by its ideal, marvelous or mysterious subjects and situations. Story telling, out of which by successive stages the novel has grown, is of great antiquity. Ancient Egypt had a large stock of tales which, when they became current in Europe, centuries later, were found to possess an interest of their own, quite apart from their historical value. India produced in the sixth century A. D. a romance called *The Adventures of the Ten Princes*, similar in character to *The Arabian Nights*, which appeared later in Arabia. Fiction in Japan, which began with short narratives, did not become of importance until the eleventh century, when appeared the first long tale, a romance of love; while in China, the novel did not develop until two or three centuries later. Among the Greeks and Romans novels were produced in small numbers, the first product of the Greeks being the *Milesian Tales*, none of which is extant. The most famous Greek name in this connection is Heliodorus, who lived in the fourth or fifth century and who wrote a romance of love. Of the Latin romances, the most notable is the *Golden Ass* of Apuleius, in which is related the beautiful story of Cupid and Psyche. Fiction during the Middle Ages took at first the form of the metrical romance, out of which grew gradually the romance of adventure in prose and verse and finally, the prose tale. Of the medieval type of fiction, the best specimens are *Aucassin and Nicolette* and the *Canterbury Tales* by Chaucer.

The first novel, using the term in something like the modern sense, appeared in the *Decameron* of Boccaccio (about 1353), which furnished the model for innumerable works during the many years which followed. During the sixteenth and seventeenth centuries, the growing cosmopolitanism of Europe and the consequent advent of new modes of thought and expression from the East gave an impetus to novel writing such as it had never felt before. The invention of printing, too, made it natural that the old romance in verse, adapted to singing or reciting, should give place to prose. From 1475 on, in England, Caxton printed numerous romances, among which the *Morte d'Arthur* (1485) marked a distinct advance. In 1515 appeared Sir Thomas More's *Utopia*, a dream of an ideal socialistic state. Much of the credit for the development of the structural forms of the novel is due to Spain. *Amadis of Gaul* (1470) is among the first prose romances in modern form; while to this period in Spain belong also the *picaresque*, or rogue, stories and, most famous of all, the *Don Quixote* of Cervantes, intended as a burlesque on the exaggerated romance of chivalry. Great as was the Elizabethan Age in English literature, it produced little of importance in fiction. Sir Philip Sidney's *Arcadia*, Lyly's *Euphues* and Nash's *Unfortunate Traveller* complete the list of novels to the seventeenth century.

A great step in the progress of the novel was marked by the appearance, late in the seventeenth century, of Bunyan's *Pilgrim's Progress*, which presented the only true and definite picture of human life which the seventeenth century in England produced. And when, early in the eighteenth century, a man appeared who had all of Bunyan's narrative powers and ability to make a story real by the addition of telling details, and who told his stories without allegory, the history of the modern novel had begun. This first novel, in the modern sense, was Defoe's *Robinson Crusoe* (1719). Seven years later appeared Swift's *Gulliver's Travels*, the greatest example of satire in fiction. Under Richardson and Fielding the novel of everyday life was greatly improved, and its dramatic element was emphasized. From that time the novel has changed little structurally. The works of Smollett and Sterne show that prose fiction had, in a certain sense, degenerated. The object was no longer to picture life as it was, but simply to cater to the demand for amusement of a coarse kind. Sterne has given us in *Tristram Shandy*, however, one of the great character portraits in fiction—Uncle Toby. In Goldsmith's *Vicar of Wakefield*, the coarseness and brutality which had characterized the works of previous authors disappeared, and a cleaner and fresher atmosphere was introduced.

A differentiation in the kind of novels began, in the late eighteenth and early nineteenth centuries, to make itself felt. The "novel of manners," as it may be called, began with Frances Burney's *Evelina* and reached its highest point in the works of Jane Austen. Peculiarly characteristic, however, of the early nineteenth century are the romantic historical novels of which Scott, if not exactly the creator, was the greatest writer. He lent a great impetus to English novel writing, and since his day, among authors in England, novel writers have been much the most numerous class. Among the authors who followed Scott, and in some of whom his influence may be strongly felt, were Lever, Mrs. Craik, Disraeli, Bulwer-Lytton, Dickens, Thackeray, Charlotte Brontë, Trollope, Kingsley, Marryat, George Eliot, Wilkie Collins, Mrs. Oliphant, Miss Yonge, Hughes, Reade, Black, Hardy, Blackmore, Besant, Rider Haggard, Stevenson, George Meredith and George Macdonald. Of the more modern British novelists the most important are Kipling, Mrs. Humphrey Ward, James M. Barrie, John Watson (Ian Maclaren) and Anthony Hope. Among the French the novel is best represented by the works of Daudet, Maupassant, Zola, Hugo, Chateaubriand, Madame de Staël, Dumas (father and son), Balzac, George Sand and Mérimée. The most noteworthy names in the German group of novelists are Gutzkow, Auerbach, Freytag, Heyse, Ebers and Rosegger. As the leading representatives of other modern nations may be mentioned Turgenieff and Tolstoi, for Russia; Björnson, for Norway; Hans Christian Andersen, for Denmark, and Jokai, for Hungary.

In America the novel, like other forms of literature, was slow in developing, and received little attention until well on into the nineteenth century. Charles Brockden Brown was the first notable adventurer in the field, but his *Wieland* (1797) and *Clara Howard* were but weak attempts at realistic fiction. James Fenimore Cooper was also a pioneer, but he soon established an international reputation as a master of interesting adventure, winning by his thrilling sea and indian tales the title of "the American Scott." Washington Irving tried his hand at novel writing and won recognition, although his works, considered as novels, have many limitations. With Poe, American fiction reached its first great height, for his weird tales, full of mystery and strange psychological phenomena, still rank among the best of their kind. Notable among them are the *Murders of the Rue Morgue, Fall of the House of Usher, The Mask of the Red Death,* the *Pit and the Pendulum* and *Ligeia.* Poe had a worthy successor in Nathaniel Hawthorne, by whom American romance was brought to its greatest perfection, and who ranks, in conception of plot, portrayal of character and artistic execution, with the great novelists of his century. In 1851 was published Harriet Beecher Stowe's *Uncle Tom's Cabin,* which was noteworthy, not chiefly as a novel, but as a popular treatise on slavery.

Within the last half century, novel writing has greatly increased in the United States, and many prominent names may be mentioned in connection with its development. Oliver Wendell Holmes published two novels which, although somewhat careless in structure, give accurate portrayals of the New England character. Bret Harte, Hamlin Garland and Owen Wister have written of the far West in its various aspects; George W. Cable, Thomas Nelson Page and Joel Chandler Harris have done the same for the South, while Elizabeth Stuart Phelps, Mary Wilkins Freeman and Sarah Orne Jewett have made the types of New England character familiar throughout the country. Mark Twain, whose scenes are laid chiefly in the Mississippi valley, makes a universal appeal through his genial humor. As examples of the realistic novel may be mentioned the works of William Dean Howells, studies of American types and life; the works of Henry James, studies of intricate psychological subjects, and the works of Edith Wharton, carefully drawn character portraits. Among writers who take as their theme animal life, the most prominent is Ernest Thompson Seton; while among those who have based their work on historical incidents may be mentioned Winston Churchill and S. Wier Mitchell. The number of historical novels within recent years has been exceedingly great, but few of them seem destined to live, and the political life and social conditions of the United States are gradually replacing in popularity the historical theme. Of the innumerable works of fiction which the last years have produced, there are few, or none, which may be regarded as approaching in any way the masterpieces of the past. For a fuller account of the works of the novelists mentioned in this article, see the name of each in its proper alphabetical position in this work.

Novem'ber, formerly the ninth month of the year, but according to the Julian arrangement, in which the year begins on January 1, November became the eleventh month and comprised 30 days.

Novgorod, or **Novgorod-Veli'ki** *nov'go rod ve lee'ke,* a city of Russia, capital of the government of the same name, on the Volkhov, about 2 mi. from Lake Ilmen and 20 mi. s. of Saint Petersburg. The river divides it into two parts; that on the left bank, with the kremlin and cathedral, is known as the Sophia side; that on the right bank is the commercial town. Novgorod during the Middle Ages was the largest and most important town of northern Europe. It was the cradle of the Russian monarchy, and in 1862 a monument was erected to commemorate the one thousandth anniversary of the foundation of the Russian State by Rurik. The trade and manufactures of the town are now unimportant. Population, 26,095.

No'vum Or'ganum (new instrument or method), the second part of Francis Bacon's great work, the *Instauratio Magna* (The Great Restoration), published in 1620. It lays down the principles of the modern inductive, or scientific, method, that of proceeding from facts to general laws, rather than inferring facts from insufficiently proved laws, after the manner of the old deductive logic.

N-Rays, the name given certain peculiar rays of light that were discovered by Professor Blondlot of the University of Nancy, while trying to polarize X-rays (See ROENTGEN RAYS; POLARIZATION OF LIGHT). The name is from the town of Nancy, in whose university the rays were first discovered. N-rays resemble X-rays in some respects and widely differ from them in others. They will penetrate most substances, but platinum, rock salt and water are opaque to them. They penetrate a dry cloth readily, but the thinnest fabric when wet obstructs them. They render such substances as calcium sulphide phosphorescent, provided these substances have been exposed to the sunlight before being acted upon by the N-rays. Experiments show that N-rays exist in sunlight, but are obstructed by clouds and moisture in the atmosphere. Their properties and use are not yet well understood. Attempts to use them in photography have not been successful.

Nu'bia, a name given to a region of northeastern Africa, bounded by Egypt on the n., by the Red Sea on the e., by Abyssinia and Kordofan on the s. and by the Libyan Desert on the w. It is not now a political division, as part of the territory belongs to Egypt and the rest to Egyptian Sudan. With the exception of the valley of the Nile, the country is generally desert. Suakin, on the Red Sea, is the only practicable port. The Nubians belong to the Arabian and Ethiopian races. They are a handsome people, of dark brown complexion, bold and cheerful and more simple in their manners than their neighbors either up or down the river. From 1822 to the revolt of the Mahdi in 1884 and 1885, the country was subject to Egypt, to whose control it was restored by the victories of Lord Kitchener in 1896 and 1898. See EGYPT, subhead *History*; also RACES OF MEN, *color plate, Negro Types*, Fig. 2.

Nuisance, *nu'sans*, any reckless or inconsiderate use of one's liberty or property, which, without destroying the substance of other property, impairs its use and enjoyment. Nuisances are defined as of two kinds—*public*, or *common*, and *private*. Public nuisances are offenses against the public as a whole, as annoyances in highways, bridges and public rivers and injurious or offensive trades, which, when hurtful to individuals, or detrimental to public health or convenience, may be proceeded against in law and made to bear fine or damages. A private nuisance may be defined as an injury or annoyance to the person or property of an individual, as where one projects the eaves of his house over those of his neighbor, stops or obstructs a right of way or carries on an offensive trade. Causing inconvenience to one's neighbors may not in itself be a nuisance at law; there must be positive discomfort or danger. Nuisance, whether private or public, is rather a civil than a criminal offense. The remedy at law for the injury of nuisance is either an action for damages, the abatement of the nuisance by the complainant's own act, provided he occasion no unnecessary damage, or an injunction.

Nul'lifica'tion, in American history, the attempt by a state formally to suspend a law of the United States within its territory. This right was first declared in the famous Kentucky and Virginia Resolutions of 1798, on the ground that the Union was a compact of independent states. The same right was asserted by the government of Pennsylvania in 1809 and was practically assumed by several New England states during the War of 1812. In 1825 Georgia successfully asserted its right against the government concerning a question of jurisdiction over indian lands. The most famous instance was in South Carolina in 1828, when John C. Calhoun, in an essay called the *South Carolina Exposition*, argued that each state was a sovereign in itself, the Federal government being its agent, and that the state therefore had the right to suspend a power which it had delegated to its agent. The same doctrine was upheld by Robert Y. Hayne in his famous debate with Daniel Webster in 1830.

In both cases the immediate cause of the declaration was the protective tariff policy which injuriously affected the South. In 1833 the legislature of South Carolina declared the tariff acts of 1828 and 1832 null and void and threatened secession if the government of the United States attempted to enforce the law. Measures of military defense were taken, but President Jackson issued a proclamation warning the people of the state of the results of their action and declaring his purpose to enforce the law at any cost. A bill known as the Force Bill (See FORCE BILLS) was passed in March, 1833, but compromise was meantime effected, and the nullification ordinance was repealed.

Nu'ma Pompil'ius, the second king of Rome, who is said to have reigned from 714 to 672 B. C. He was of Sabine origin, and was distinguished as a philosopher and legislator, though, like the other early kings, he has more a legendary than an historical existence. He was regarded as the founder of the most important religious institutions of the Romans and left writings explanatory of his system, which were burned by order of the Senate when accidentally discovered 400 years after his time.

Number, the measure of the relations of magnitude existing between two objects of the same kind. An abstract number is the result obtained by the comparison of one quantity with another quantity, which is considered a unit of measurement; that is, the result of comparing the magnitude of 7 apples with that of 1 apple is the abstract number 7. When a concrete name is attached to a number, designating the nature of the quantity which is measured, the number is said to be concrete. Thus, the expression 7 *apples* is a concrete number.

In common use, the term *number* also represents the idea of a single unit or thing and of a collection of units or things. Furthermore, the idea of nothing, or *zero,* of quantities or magnitudes less than nothing, or *negative quantities*, and of an immeasurable or inconceivable magnitude, or *infinity,* are also considered as numbers. Numbers are classified according to their divisibility as *odd* or *even* and *prime* or *composite.* An *odd* number is one that is not divisible by 2; a *prime* number is one that has no factors other than itself and 1. As to their structure, numbers are *rational* or *irrational, simple* or *complex.* An *irrational* number is one which cannot be expressed as a whole number or as a fraction; for example, $\sqrt{2}$. A *complex* number is one which expresses the sum of a real number and of an imaginary number (See IMAGINARY QUANTITY). As to their relation to a fixed point, called *zero,* numbers are *positive* or *negative* (See NEGATIVE QUANTITY). Certain numbers are also called *figurate numbers* (See FIGURATE NUMBER). Numbers which answer the question "How many?", such as *1, 2, 3,* are called *cardinal* numbers, in distinction from those which answer the question "Which one of a series?", as *first, second, third,* which are called *ordinal* numbers. See NUMBER, METHODS OF TEACHING.

Number, METHODS OF TEACHING. Instruction in number should secure two results, namely, (1) comprehension of magnitude and magnitude relations and (2) ability to use figures accurately and with facility. At the outset the teacher should understand that numbers are not things or qualities of things, but that number is a relation, which is obtained only through mental processes.

PRIMARY GRADES. Children have more or less knowledge of number when they enter school. This is manifested by their tendency to count and to measure. A test will probably show that most of them know number as far as five and that all have the idea of magnitude. The work in these grades should proceed along the following lines:

(1) *Obtaining a knowledge of magnitude and magnitude relations.* This should be done by measurement, since measurement is the foundation of all number work. Pupils should at first be given objects of different sizes, such as blocks of different lengths, and encouraged to compare them. They will express the result of their comparisons in such terms as *larger* and *smaller, longer* and *shorter.*

(2) *Counting.* Pupils should be led to count by noticing the number of objects in different groups, as three marbles, four blocks, five flowers. A serious mistake is often made in teaching children to count by single objects, as by pointing to each of a series of blocks and counting one, two, three, four. Unless the child already knows what two, three and four are, he gets the idea that these words are names of the different blocks, rather than groups of objects.

(3) *Perfecting the idea of magnitude.* The ideas first obtained are vague, as expressed in comparisons, such as *larger, smaller.* The pupils should soon be led to form definite ideas of such dimensions as foot, inch, yard, pound, pint and other units of measure in common use. This should be done by using the measures. In primary grades this work will proceed very slowly and in connection with other lessons. In many well-graded schools, lessons in number are not given any separate period during the first year, but are given incidentally in connection with other lessons, such as nature study and language.

(4) *Obtaining an idea of proportion, or relative magnitude.* Pupils should be led to form ideas of the relations of objects of different sizes, such as the relation of an inch cube to a two-inch cube, of a prism two inches long and an inch square to one two inches long and two inches square, and of a pint to a quart. These ideas are obtained by the use of the objects, which should always be at hand when new work in number is attempted.

(5) *Learning to use figures.* Since figures are the symbols of numbers, they should not be introduced until the ideas which they represent

are fully understood. Ordinarily they may be introduced about the beginning of the second year. In their introduction the following order should be observed: (*a*) The idea should be represented by the object; (*b*) the idea should then be represented by the written word; (*c*) the written word should be followed by the figure. After the figures have been introduced, in the following lesson the pupils should be tested, so that the teacher may know that they understand what each figure represents. This can readily be done by asking the different pupils to bring the teacher the number of objects which the figure written upon the board represents.

(6) *Gaining habits of accuracy.* Accuracy is essential to success. Unless the teacher insists upon accurate work from the beginning, habits of carelessness are formed which are liable to affect the pupil all through his school life. Most errors result from hasty and careless observation; hence, the pupil should be led to observe carefully and to form definite and accurate conclusions. By continual persistence in this method, the habit of accuracy will be established.

(7) *Gaining facility in arithmetical operations.* As fast as the pupils obtain accurate ideas, they should be drilled in the use of these until they acquire facility. This can be accomplished by devoting a portion of the number period each day to review drills.

(8) *Memorizing the facts of number.* As fast as the facts of number are understood, they should be learned. These facts of elementary number are comparatively few. There are only forty-five in addition and sixty-four in multiplication. When these are learned, they carry with them the primary facts of subtraction and division, and all should be mastered by the time the child has completed his third year in school.

Intermediate and Grammar Grades. In the intermediate grades the work in number usually passes to the work in arithmetic. This is different in degree, but not in kind. The text-book is usually introduced into the fourth grade, and unless the pupils have been prepared for this in the preceding grade the teacher should devote the first few lessons to such review as may be necessary to introduce the class to the book. The same methods employed in the primary grades should be continued and be extended as the needs of the class demand. Objects should be used whenever they are necessary to give the pupils a clear idea of the process under consideration.

In addition to the work in fundamental operations, the pupils of the fourth grade should acquire a clear idea of the common fractions in most general use. The primary idea of fractions should be obtained in the preceding grades, but here this idea should be elaborated and extended until the pupils are able to add and subtract fractions of different denominations as far as twentieths, by reducing them to equivalent fractions having the same denominator. The principles of the reduction of fractions can easily be learned by the use of drawings or paper, which can be folded to represent the necessary divisions.

Teachers often err in not making a distinction between an equal part of an object and one of a group of objects of the same sort, as using one of four apples to represent $\frac{1}{4}$. The difference between one of four apples and one-fourth of an apple should be apparent, but when one illustration is used for the other, it often leads to a confusion of ideas. The teacher should also see that the pupil has a correct idea of the unit value of his result. Failure to do this often leads to ridiculous conclusions. For instance, the division of $\frac{3}{4}$ by $\frac{1}{2}$ gives a quotient of $1\frac{1}{2}$, but when questioned as to what the $1\frac{1}{2}$ represents, the pupil is very likely to have the idea that the number represents $1\frac{1}{2}$ units or wholes.

Many practical problems should be given in these grades. In difficulty they should be kept within the capacity of the pupils, and they should deal with the affairs of daily occurrence. Common weights and measures, the use of decimals as applied to money and the simple computations found in stores should be thoroughly taught in the fourth grade. These problems should constitute a part of the seat work and a part of the recitation work. The seat work should be done with care and supervised by the teacher; otherwise pupils will fall into the very injurious habits of listlessness and inaccuracy. When this occurs the seat work is of little or no benefit.

Denominate numbers, as far as they are in common use, should be taught in the intermediate grades. This should be done by the use of common weights and measures and their application to such problems as occur in actual business. After these measures have been learned by use, their tables can be memorized. Pupils should also be taught, in connection with this work, to write receipts and promissory notes and to make out bills of items bought and sold. In the higher grades the operations in percentage, including profit and loss, interest and discount should receive special attention, but the books used in these grades usually give such explanations as to render the discussion of special methods unnecessary.

Numbering Machine, a machine for impressing consecutive numbers on account books, coupons, railway tickets, bank notes and other forms of commercial papers. One of the principal forms of the apparatus consists of a series of disks or wheels, each numbered to ten on its circumference. All are mounted on one axle, upon which they turn freely, acting upon one another in serial order. The first wheel of the series, containing the units, is moved one figure by each stroke or movement, and when the units are exhausted, the tens come into action and act with the units, so that for every ten units marked off, one ten is marked off. When the disk of tens has moved ten times, the hundred disk moves once. Often there are wheels representing thousands and even ten-thousands.

Numbers, Book of, the fourth of the books of the Pentateuch. It takes its name from the records which it contains of the numbering of the Israelites, the first given in chapters I–IV, and the second in chapter XXVI. It gives a narrative of the journeyings of the Israelites, from the time of their leaving Sinai to their arrival at the plains of Moab, besides portions of the Mosaic law. Formerly the authorship was attributed to Moses, but some modern scholars claim the book is made up of several parts, each of which has a separate author.

Numid'ia, an ancient country of North Africa, corresponding roughly to modern Algeria. It was divided among various tribes, but after the Second Punic War it was united under Massinissa, and several of its rulers became noted in Roman history. In 46 B. C. it became a Roman province, and at the division of the Roman Empire it became a part of the Western Empire.

Numismatics, *nu'miz mat'iks,* the science of coins and medals. The word *coin* is in modern times applied to those pieces of metal struck for the purpose of circulation as money, while the word *medal* signifies pieces of metal similar to coins, not intended for circulation as money, but struck and distributed in commemoration of some person or event. Ancient coins, however, are often termed medals. They are gold, silver, bronze, electrum or billon, and in ancient times they served not only as a currency, but also as chroniclers of important political events and as abstracts of the times. It is also from coins alone that we derive our knowledge of some of the most celebrated works of ancient art, particularly of ancient statuary. In ancient, as in modern times, while the coins of empires or kingdoms were (at least in later times) distinguished by the head of the reigning prince, those of free states were distinguished by some symbol. Medieval coins include the Byzantine, the coins of the various European states from the fall of Rome to the accession of Charlemagne; the Carlovingian currency, from Charlemagne to the fall of the Swabian house (1268); the coins of the early Renaissance, to 1450, and those of the classical Renaissance, from 1450 till 1600. Modern coinage may be said to begin with the dating of coins. Evidence shows that the origin of coinage in the Orient was quite independent of European coinage, and China is said to have had a coined currency in the third millennium B. C.

Num'mulite (Latin *nummus,* money; Greek, *lithos,* stone), a name common to fossils (See Foraminifera) having somewhat the appearance of money. The shell has no apparent opening, and internally it contains a spiral cavity, divided by partitions into numerous chambers, communicating with one another by means of small openings. Nummulites vary in size from less than one-eighth of an inch to one and one-half inches or more in diameter. They occupy an important place in geology, on account of the prodigious extent to which they are accumulated in the lower Tertiary strata. They occur so abundantly in some parts of the Eocene formation, that the name of *nummulitic limestone* is given to the strata so characterized. This series is characteristic of the Old World, often attains a thickness of many thousand feet and extends from the western shores of Europe and Africa through Asia to the east of China. The pyramids of Egypt are constructed of a stone largely composed of nummulites.

Nun, a word of unknown origin, but supposed to be connected with a Coptic word signifying "pure." In the Roman Catholic Church it is applied to a woman who retires from the world, joins a religious sisterhood, takes upon herself the vow of chastity and the other vows required by the discipline of her convent and consecrates herself to a life of religious devotion. Nearly all the masculine religious orders had corresponding feminine institutions, while there were also numerous independent orders of nuns. At present the number of nuns is largely in excess of that of monks. The first nunnery is said to have been that founded by a sister of Saint Anthony, about 250 A. D., and the first in England was founded at Folkstone, by Eadbald, king of Kent, in 630.

Nunc Dimit′tis (now lettest thou depart), the first two words of the Latin version of the canticle of Simeon, given in *Luke* II, 29–32. It is used as the designation of the whole canticle, which forms part of the evening service in the *Book of Common Prayer.*

Nuncio, *nun′she o,* an ambassador of the first rank (not a cardinal) representing the pope at the court of a sovereign entitled to that distinction. A papal ambassador of the first rank, who is at the same time a cardinal, is called a *legate.* The title of *internuncio* is given to an ambassador of inferior rank, who represents the pope at minor courts. Formerly the papal nuncios exercised the supreme spiritual jurisdiction in their respective districts, but now, in the Catholic kingdoms and states which hold themselves independent of the court of Rome in matters of discipline, the nuncio is simply an ambassador.

Nuremberg, *nu′rem burg,* (German, *Nürnberg*), a city of Bavaria, on the Pegnitz River, 95 mi. n. of Munich. It is surrounded by well-preserved ancient walls, with numerous massive towers and gateways, and the whole is enclosed by a dry moat. The Pegnitz, traversing the town from east to west, divides it into two nearly equal parts, which communicate by numerous bridges. It contains a large market place and a number of interesting buildings, among which are the Church of Saint Lawrence, the Church of Saint Sebaldus and the medieval imperial castle, the Kaiserburg. The general appearance of the city is distinctly medieval, and it is one of the quaintest cities of Europe.

Nuremberg has extensive breweries and produces, also, large quantities of toys, fancy articles in metal, carved wood and ivory, as well as chemicals, clocks, watches, cigars, lead pencils and electric supplies. The town is celebrated for the invention of watches in the fifteenth century. Nuremberg was an independent imperial town down to 1806. It was one of the first of the imperial towns to cast its lot for the Reformation, and it suffered extensively during the Thirty Years' War, when Gustavus Adolphus was besieged there by Wallenstein. Before the discovery of the water passage to India, Nuremberg was the great mart for the produce of the East coming from Italy and going to the north. Its trade, though it has declined somewhat, is still important. Population in 1900, 261,081.

Nurse, one who tends or takes care of the young, sick or infirm; specifically, a female hospital attendant. There are now numerous institutions where active, intelligent and physically able women are thoroughly trained for this work. In the larger schools or hospitals the course of study covers two or three years and gives not only an understanding of the theories of all departments of nursing, but also a varied practice at the bedside of invalids. The first class to graduate in the United States was sent from the Bellevue Training School in New York City in 1872. The system of sending trained nurses to the seat of war originated with Miss Florence Nightingale during the Crimean War, and organizations for military nursing are now common to all civilized countries.

Nurs′ery, in agriculture, a tract of land devoted to raising shrubs and trees for sale. In its broadest sense the term includes the culture of herbs and plants, as well as trees and shrubs, but in the United States the meaning is restricted as shown above. Nurseries exist for the purpose of supplying ornamental trees and shrubs, shade trees and fruit trees. The industry is the most fully developed in the western part of New York, in the vicinity of Rochester. Fruit nurseries are usually given to the raising of apple, peach, prune and other plum trees, and grape vines, and occasionally to the growing of shrubs that produce small fruits, such as the blackberry and the raspberry. However, in the United States, by far the largest part of the nursery business is confined to the growing of apple trees. Most of these trees are grown by grafting the scions into native stock (See GRAFTING). According to the United States census in 1900, there were 4500 nurseries in the country, and the capital invested in the business amounted to $52,500,000.

Nut, a hard, one-seeded fruit, containing an oily meat enclosed in a shell. The most common varieties of nuts are the hazelnut, the chestnut, the English walnut, the hickory nut, the pecan and the Brazil nut. The Brazil nut and the cocoanut are products of tropical climates. Almonds, English walnuts, chestnuts and pecans are grown successfully in California and in some other parts of the United States. The walnut crop and the almond crop of California are both valuable.

Nuts are valuable for food, since they contain suitable proportions of fat and other nutritive matter. When eaten in connection with other food, they are found to be digestible and healthful, and they are now quite extensively used in the preparation of food products.

Nuta'tion, in astronomy, a small, subordinate, vibratory movement of the earth's axis, by virtue of which, if it subsisted alone, the pole would describe among the stars, in a period of about nineteen years, a minute ellipse, having its longer axis directed toward the pole of the ecliptic, and the shorter, of course, at right angles to it. The consequence of this real motion of the pole is an apparent approach and recession of all the stars in the heavens to the pole in the same period; and the same cause will give rise to a small alternate advance and recession of the equinoctial points, by which, in the same period, both the declinations and the right ascensions of the stars will be also alternately increased or diminished. This nutation, however, is combined with another motion, namely, the precession of the equinoxes, and in virtue of the two motions, the path which the pole describes is neither an ellipse nor a circle, but a gently undulating ring; and each of these undulations constitutes a nutation of the earth's axes. Both these motions and their combined effect arise from the action of the sun and moon upon the earth.

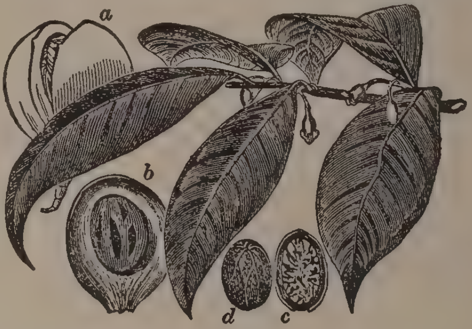
Nut'cracker, a bird common in the mountains of central Europe and sometimes seen in England. It belongs to the crow family and is about the size of a jackdaw. Its name is due to its habit of cracking the nuts of fir trees by striking them, much as a woodpecker strikes a tree.

NUTCRACKER

Nut'hatch, the common name of several very active little birds, that are common in most parts of North America and Europe. They are usually of shy and solitary habits, frequenting the woods and feeding chiefly on insects, which they find in the crevices of the bark of trees. They are usually seen head downward, working around the trunk of the tree, peering sharply into the crevices and steadily calling out their rough cries—nasal notes which seem altogether too loud for such small birds. The white-breasted nuthatch of the United States is of a slatish-gray color, with brownish lower parts, white throat and a white line over its eye.

NUTHATCH

Nut'meg, the kernel of the nearly spherical fruit of a tree growing principally in the islands of Banda, in the East Indies. The fleshy part is of a yellowish color without, almost white within, and opens into two nearly equal longitudinal valves, presenting to view the nut, surrounded by the *mace.* The nut is oval, the shell very hard and dark brown. This immediately envelops the kernel, which is the nutmeg commonly used in commerce. The tree has been introduced into Sumatra, India, Brazil and the West Indies. It reaches the height of twenty or thirty feet and produces numerous



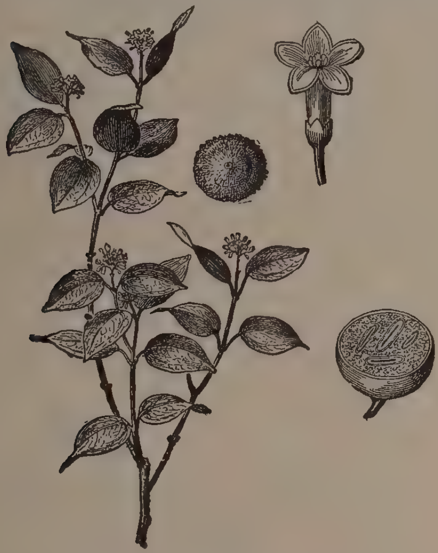
NUTMEG

a, fruit bursting open; *b*, the same, with one valve removed, showing the seed; *c*, section of seed; *d*, seed with the covering removed.

branches. The color of the bark of the trunk is a reddish-brown; that of the young branches, a bright green. The nutmeg is aromatic, is pleasing to the taste and smell and is much used in cookery. It yields, by distillation with water, a transparent oil, called oil of mace or oil of nutmeg.

Nutrition, *nu trish'un,* the act or process by which vegetables and animals are able to absorb into their systems their proper food, thus promoting their growth or repairing the waste of their tissues. The nutrition of the human body implies "the reception of food; the digestion of food; the absorption of digested food, which must be carried to every organ; the absorption of oxygen in the lungs, which the blood must carry to every organ; assimilation, or the building up of new tissue from material brought by the blood; the taking up of waste which has been produced by the oxygen combining with tissue; the carrying of this waste to the excretory organs." See DIET; DIGESTION; FOOD; RESPIRATION.

Nux Vom'ica, the fruit of a species of *strychnos,* which is found in various parts of the East Indies. It is about the size and shape of a small orange and has a very bitter, acrid taste. It is a virulent poison, and from it is prepared an extremely poisonous drug. See STRYCHNINE.



NUX VOMICA

Nyassa, *nyas'sa,* a large lake in southeastern Africa, s. e. of Lake Tanganyika. It is about 340 miles long, about 40 miles wide, and has an area of 14,200 square miles. The surface is over 1500 feet above the sea level, and the waters are sweet and abound in fish. The lake is drained southward by the Shire River, a tributary of the Zambezi. Lake Nyassa was discovered in 1859 by Livingstone. There are missionary stations and trading stations on the shores, and a road has been constructed between Nyassa and Tanganyika.

Nyassaland, *nyas'sa land.* See BRITISH CENTRAL AFRICA.

Nye, EDGAR WILSON (1850–1896), an American humorist, better known as *Bill Nye.* He became famous as a humorous lecturer, writer, and story-teller. *Bill Nye and the Boomerang, Forty Liars and Other Lies* and *Chestnuts* are the titles of some of his volumes, full of puns and witticisms. He wrote also *A Comic History of the United States* and *A Guest at the Ludlow,* a collection of humorous sketches and stories. Mr. Nye was born in Shirley, Maine, spent his childhood in Wisconsin, was admitted to the bar in Wyoming, settled finally in New York and died near Asheville, N. C.

Nylghau, *nil'gaw,* a species of antelope a little larger than a stag, inhabiting the forests of northern India and Persia. The horns are short and bent forward; there is a beard under the middle of the neck; the hair is grayish blue. The female has no horns. The nylghau is much hunted as one of the noblest beasts of the chase, the skin of the bull being in demand for the manufacture of native shields. The name nylghau literally means *blue ox* and has, doubtless, been applied to this animal from the ox-like proportions of its body.

Nymphs, *nimfs,* in mythology, a numerous class of inferior divinities, imagined as beautiful maidens, not immortal, but always young, who were considered as tutelary spirits, not only of certain localities, but also of certain races and families. They occur generally in connection with some other divinity of higher rank, and they were believed to be possessed of the gift of prophecy and of poetical inspiration. Those who presided over rivers, brooks and springs were called *Naiads;* those over mountains, *Oreads;* those over woods and trees, *Dryads* and *Hamadryads;* those over the sea. *Nereids.*

O

O, the fifteenth letter and fourth vowel in the English alphabet. In form, the letter is derived through the Greek and Latin from the Phoenician, its pictograph having been, probably, an eye. In English, *o* represents two main sounds—the "long *o*" sound, in *note*, *go*; and the "short *o*" sound, in *not*, *got*. Besides these, it has several other sounds—the *oo* sound in *move*; the shortened sound corresponding to this, as in *wolf*, and the short *u* sound, in *love*. It is also a common element in digraphs, as *oo*, *oa*, *ou*.

Oahu, *wah'hoo*, the most important of the Hawaiian Islands. It has an area of 600 square miles and is quite generally fertile. The city of Honolulu, the capital of the territory, is situated upon the island. The surface is mountainous and contains several volcanic peaks and many inactive craters. The fertile land is in the valleys and on the low plains. The population in 1900 was 58,504. See Hawaii.

Oak, *oke*, a genus of hardwood trees, found extensively in the north temperate zone. They belong to the cup-bearing family, so called because the fruit appears in the form of a nut held in a cup, like the acorn. Oaks are characterized by widely-branching tops, by leaves that are usually deeply indented at the margins, by small, inconspicuous flowers, which appear in catkins, and by having acorns for fruit. The bark is dark gray or almost black, the wood is hard, coarse-grained and strong. The ilex of Europe and the live oak of the United States are evergreens. All the other species shed their leaves. In size the species range from trees 100 feet or more in height to small shrubs.

The oak has always been recognized as one of the noblest trees, and it has often been styled the "Monarch of the Woods." In the traditions of Europe and a great part of Asia the oak appears as an important element in religious and civil ceremonies Large oak forests are found in England, France, Germany and most of the other countries of northern Europe In the United States the oak is common from Canada to the Gulf of Mexico and as far west as the Mississippi River.

The most common species in this country are the white oak, the red oak, the bur oak and the live oak. The *white oak* is found from Lake Winnipeg, in Canada, to the Gulf of Mexico. It is a large tree, with a stout trunk, and when growing in open spaces it has large, spreading branches. The wood is tough and hard and of a reddish-brown color and is extensively used for numerous purposes where strong wood is required. The *red oak* rivals the white oak in size. When the leaves appear in the spring they are pink, and in the autumn they change to a deep purple. It is from this characteristic that the tree takes its name. It is found in about the same localities as the white oak, and its timber is of equal value. The *bur oak* is a small species, characterized by its rough bark, irregular branches and dark-colored, coarse-grained wood. The tree is of but little value except for fuel. The *live oak* is found in the Southern states and along the Atlantic coast as far north as Virginia. It often grows to a large size and has oval, dark green leaves, which remain on the tree through the year. It is a valuable timber tree. Among the foreign species the *British oak* in England and in the forests of other European countries closely resembles the white oak. *Cork oak*, common to Spain and Portugal, is valuable for its bark, which is the source of cork (See Cork).

Oak lumber is used in finishing interiors, in the manufacture of furniture, in shipbuilding, in making frames for machinery and carriages and in basketry, especially in the manufacture of baskets for packing fruit and vegetables. The bark is valuable for tanning. About 1,005,000,000 board feet of oak lumber are made in the United States every year. See Forests; Lumber; Tanning.

Oak'land, Cal., the county-seat of Alameda co., situated on the east side of San Francisco Bay, 6 mi. from San Francisco, and on the

Southern Pacific, the Atchison, Topeka & Santa Fé and other railroads. The city is built upon a nearly level tract of land and is regularly laid out with broad, well-paved streets, which are shaded by live oaks, palms and other trees. Oakland is the favorite place of residence for many San Francisco business men, and it is noted for its beautiful residences and pleasant streets. It has an excellent harbor and is connected with San Francisco by large steam ferries. It is the site of the California Military Academy, California College, Pacific Theological Seminary and a number of other educational institutions. The industries include iron works, foundries and machine shops, smelting works, cotton, flour and planing mills and tanneries. The destruction of the business portion of San Francisco by the earthquake and fire in April, 1906, caused considerable of the business formerly located in that city to be transferred to Oakland and temporarily, at least, increased the latter city's importance as a commercial and industrial center. Population in 1900, 66,960.

Oakum, *oke'um,* the substance of old tarred or untarred ropes, untwisted and pulled into loose fibers. It is used for caulking the seams of ships, stopping leaks and similar purposes. That formed from untarred rope is called white oakum.

Oar, *ohr,* a long piece of wood, flat at one end and round at the other, used to propel a boat, barge or galley. The flat part, which is dipped into the water, is called the *blade;* the other end is the *handle,* and the part between the two is called the *loom.* Oars are frequently used for steering, as in whaleboats. *Sweeps* are large oars used in small vessels, sometimes to assist the rudder, but usually to assist the motion of the ship in a calm. A *scull* is a short oar of a length such that one man can manage two, one on each side.

Oar'fish, one of the ribbon fishes, a peculiar deep-sea fish, fifteen to twenty feet or more in length, but extremely narrow and flat. It is of a silvery color and is rarely seen and then usually in a dying condition. See RIBBON FISH.

O'asis, originally the name of the fertile spots in the Libyan Desert, where there are springs or wells and more or less vegetation, but now applied to any fertile tract in the midst of a waste, and often used figuratively. The oases of northern Africa are generally river valleys, the waters of which are for the most part underground, or depressions, surrounded by short ranges of hills, from which small brooks descend, sometimes forming lakes. In recent times oases have been formed in the Northern Sahara and in the desert regions of the United States by the sinking of artesian wells. There are many important oases in the Western Sahara, in the Libyan Desert, in Arabia, in Persia and in the Desert of Gobi in Central Asia. In ancient times the most celebrated oasis was that to the west of Egypt, containing the temple of Jupiter Ammon, now called the Oasis of Siwah. See DESERT.

Oats, an important grain. The cultivated species of oats are subdivided into a large number of varieties, which are distinguished from one another by color, size, form of seeds, quality of straw, period of ripening, adaptation to particular soils and climates and other characteristics. The yield of oats varies from twenty bushels to eighty bushels per acre, according to soil and climatic conditions. The weight per bushel varies from thirty to forty-five pounds, and the meal product is about half the weight of the oats. Oatmeal is a cheap and valuable article of food, and its value seems to be becoming more appreciated among the wealthier classes, as it is being neglected by the poorer; but the grain is raised chiefly for food for horses. The annual crop in the United States is about one billion bushels. Illinois, Iowa, Wisconsin, Minnesota and Nebraska, in the order named, produce the largest quantities. The wild oat is supposed to be the original of all the species. See GRAINS, *color plate,* Fig. 3.

Oaxaca or **Oajaca,** *wah hah'kah,* a city of Mexico, capital of the State of Oaxaca, situated 22 mi. s. e. of the City of Mexico, near the Rio Verde and on the Mexican Southern railroad. The city is substantially built and has some fine streets and buildings. The principal institutions are the priests' seminary, an institute of science and art, a museum of antiquities and numerous convents. The city is famous for the cultivation of cochineal cactus, many gardens and plantations being located in the suburbs. Textiles, chocolate, soap and perfumery are also manufactured, and there is a considerable trade in sugar. Population in 1900, 35,049.

O'badi'ah, one of the twelve minor prophets, who foretells the speedy ruin of the Edomites. The prophecy was probably uttered during the period which elapsed between the fall of Jerusalem (586 B. C.) and the conquest of Edom by Nebuchadnezzar (583 B. C.), but the date is very uncertain.

Obe'ah, Obe or **Obi,** a species of witchcraft practiced among negroes of the West Indies and of Africa. The practicer of this form of degraded superstition is called an Obeah-man or Obeah-woman and possesses great influence.

Ob′elisk, a column of rectangular form, diminishing toward the top, usually terminating in a low pyramid. Egypt abounded in obelisks, which were dedicated to the sun god and were usually erected to record the honors or triumphs of the monarchs. They were generally in the form of a single block of hard stone, and all four sides were inscribed with hieroglyphics. The two largest obelisks were erected by Sesostris in Heliopolis, each 180 feet in height. These were removed to Rome by Augustus. In the Place de la Concorde, Paris, is an obelisk which was brought from Luxor in 1833, and in front of the Church of the Lateran at Rome is one from Heliopolis, brought to Italy in 1588. This one is 104 feet high. Besides these, are the two known as Cleopatra's Needles, which are now in London and New York (See CLEOPATRA'S NEEDLES). Several obelisks still remain in their natural position in Egypt. The largest of these is in the temple of Karnak. This and its companion obelisk are made of red granite and were erected about 1600 B. C. by Queen Hatasu, who had them quarried from the red granite of Assuan, shipped to Karnak and set up in their present position within the space of seven months. Besides those of Egypt, obelisks of smaller size have been found in the ruined cities of Nineveh and Nimrud. Those which were common to Rome, Florence and other cities had all been removed from Egypt during its government by the Roman emperors.

Oberammergau, *o′bur ahm′mur gow,* a village in Upper Bavaria, celebrated for the performance, every ten years, of the passion play of Christ's crucifixion and ascension. See PASSION PLAY.

O′berlin, JEAN FREDERIC (1740–1826), a Lutheran minister. He became pastor of Waldbach in Alsace, France, and, despite opposition, he gradually effected a wonderful improvement in the morals, industry and thrift of the community. Besides agriculture, Oberlin introduced straw-plaiting, spinning and weaving into the community, so that the village of a few hundreds became a town with 5000 inhabitants and a model to philanthropists. Oberlin College in Ohio was named for him.

Oberlin College, an institution of higher learning, established at Oberlin, Ohio, in 1833. It has a collegiate department and a preparatory school; also, departments of music, art and physical training, and a summer school. It has about 110 instructors, 1715 students and a library containing 75,000 volumes. Oberlin has always been a leader in educational movements and was the first college to admit colored students.

O′beron, in popular mythology, a king of the elves or fairies, and husband of Titania.

Obi, *o′be,* or **Ob,** a river of Siberia, which rises in the Altai Mountains, flows n. w., then n., through the governments of Tomsk and Tobolsk, and after a course of about 2500 miles empties into the Arctic Ocean through an estuary, the Gulf of Obi. Its chief tributaries are the Irtysh, the Tchulim and the Tom, and the most important towns on its banks are Barnaul, Kolyvan, Narym, Surgut and Obdorsk.

Object Glass or **Objective,** a double-convex lens, used for forming an image of the object seen through the magic lantern, microscope and the telescope. For an explanation of its workings, see articles under those heads.

Oboe, *o′boi* or *o′bo ai,* or **Hautboy,** one of the most ancient and important wind musical instruments, consisting of an ebony or rosewood box, divided into three pieces, which, when joined end to end, are about twenty inches long. It has a bell-shaped mouth, from which a small tube, in which is inserted a smaller brass tube, containing a vibrating reed, extends to the other end of the instrument.

Observatory, *ob zurv′a to ry,* a building devoted to the observation of astronomical, magnetic, meteorological or other natural phenomena. The astronomical observatory is the one of most general interest. The first European observatory was built at Nuremberg by Bernhard Walther in 1472, and this was followed in the sixteenth century by Tycho Brahe's famous observatory on the island of Hveen, near Copenhagen, while another was erected by the Landgrave of Hesse at Cassel, in 1561. Through the labors of Brahe practical astronomy became associated with the universities, and many of them founded observatories. In the United States observatories have been established at Cambridge (1839), at Washington, D. C. (1845), and in many other places. Among the most noted are the Lick Observatory, in California (1888), and the Yerkes Observatory (1897), located at Lake Geneva, Wis.

The chief function of the observatories in connection with universities is usually that of teaching, but many valuable observations have been made, and in some institutions a large part of the funds are turned in this direction. The national observatories, of which Greenwich Royal Observatory, England, and the Naval Observatory, Washington, D. C., are the best examples, are devoted entirely to the study of astronomical subjects and their application to governmental affairs.

The observatory building must be constructed in a very stable manner, and all the instruments must be kept free from motion, in order to permit the delicate observations that are necessary. Accordingly, foundations separate from the rest of the building are erected, and the instruments are placed on these so that they are entirely out of contact with the walls. The chief instruments used in the observatory are the telescope, which may be in either of two forms; the transit instrument, and the sidereal and the solar clocks.

Obsid′ian, a volcanic glass, given its hard, glassy appearance by sudden cooling. Obsidian consists of silicate of alumina, with iron and lime or potash or soda, according to the species of feldspar involved. In Mexico and Peru cutting weapons and rings were manufactured out of it by the natives. The largest known mass of obsidian is Obsidian Cliff, in Yellowstone National Park.

Ocarina, *ok a re′nah,* a musical wind instrument, of clay, clumsy in shape and pierced with a number of small finger holes. It gives a sweet tone.

OCARINA

Ocean, *o′shan,* or **Sea,** the vast body of water which covers nearly three-fourths of the surface of the globe. Although no portion of it is completely detached from the rest, the ocean has been theoretically divided into several great basins or areas, namely, the Pacific Ocean, which separates Asia and Australia from America; the Atlantic Ocean, which separates America from Europe and Africa; the Indian Ocean, which intervenes between Africa and Australia; the Arctic and the Antarctic oceans, round the north and south poles, respectively. Between these divisions no very definite limits can be drawn; thus it is impossible to say where the Atlantic or the Pacific ends and the Antarctic or Southern Ocean begins.

The bed of the ocean appears to present the same irregularities as the surface of the land, being diversified by rocks, mountains, plains and deep valleys. The deepest soundings at present known are 5500 fathoms (33,000 feet), near the Fiji Islands; 4561 fathoms (27,366 feet), near the north coast of Porto Rico (See Atlantic Ocean; Pacific Ocean). No depth exceeding 4000 fathoms (24,000 feet) has been found in the Indian Ocean.

The waters of the ocean vary as greatly in temperature as they do in depth. This is partly due to the ordinary effects of separation; but the abrupt changes and irregular distribution of temperature are chiefly owing to currents (See Currents, Marine). The Pacific and Indian oceans are both warmer in low latitudes than the Atlantic, and the mean temperature of the equatorial areas at the surface is about 81.5°; the temperature of the North Atlantic is due to the influence of the Gulf Stream. This high temperature applies only to the surface water of the ocean, for experience shows that in both hemispheres and in all latitudes the water near the bottom of the ocean is exceedingly cold. In low latitudes, water at 32° has been drawn from great depths; while in high latitudes water at 26° has been found. This is accounted for by the supposition that the cold water at the poles, by reason of its specific gravity, sinks to the bottom and spreads throughout the ocean basin. The saltness of the ocean is due to the presence of various ingredients, chiefly common salt, which are generally found in the proportion of from 30 to 40 parts to one thousand. Recent observations have shown that the color and transparency of the water of the ocean are in a large measure dependent on the degree of saltness. In general, it is found that the greater the saltness the greater the transparency, and also that where the saltness is very great the water is of a dark blue color, that where it is less the water is of a lighter blue, inclining to green, and that in the neighborhood of rivers, where the saltness is reduced to a minimum, the water is, as a rule, of a greenish yellow.

Ocean Grove, N. J., a town in Monmouth co., on the Atlantic Ocean, s. of New York City, about 30 mi. by water and 50 mi. by rail, and on the Pennsylvania and the Central of New Jersey railroads. It is a very popular summer resort, controlled by the Ocean Grove Camp Meeting Association of the Methodist Episcopal

Church. Theatrical performances and the sale of tobacco and intoxicating liquors are prohibited, and strict Sunday laws are rigidly enforced. The prominent buildings are the post-office, the township high school and the Auditorium, seating 10,000 people, where the religious services are held. There are many hotels, boarding houses and summer cottages. Asbury Park is just to the north, separated from Ocean Grove by Wesley Lake. The association was organized in 1869, and the first building was erected in 1875. Population in 1905, 1574, and in summer, 25,000 or more.

Oceania, *o she an'i a,* or **Oceanica,** a term used by some geographers to include all the islands of the Pacific between Asia on the northwest, the Indian Ocean on the west, the Antarctic Ocean on the south and America on the north and east. The term *Australasia* is also applied to the same area, including Australia. See AUSTRALIA.

Ocelot, *o'se lot,* an animal of the cat family, found in America, from Texas south to Patagonia. It is about three feet in length and is of a tawny or gray color on the back and sides and white on the under part of the body. Its coat is beautifully marked with black spots and bars. The ocelot inhabits forests and lives mainly on birds and mice and other small animals. It is killed for its beautiful skin. The ocelot is also called the panther cat.

OCELOT

Ochre, *o'kur,* a combination of peroxide of iron with water. The name is, however, generally applied to clays colored with the oxides of iron in various proportions. Considerable quantities of ochre are obtained from the mud separated from tin and copper ores, since it contains more or less iron; and it is also found in natural beds some feet thick in the more recent formations. Ochres vary in color from a pale sandy yellow to a brownish red and are much used in the manufacture of paints.

Ocklawaha, *ok'la wah'hah,* a river of Florida, which, after a very winding course of about 275 miles, flows into the Saint John's River, about 25 miles above Palatka. Its banks are densely wooded, and the country is so flat that the waters extend into the forest for a distance on either side. Many tourists visit it.

Ocmul'gee, a river which rises in the northern part of Georgia, flows s. s. w., then e., and finally unites with the Oconee to form the Altamaha River. Macon is the chief town on its banks. Its total length is about 275 miles, and it is navigable as far as Macon.

Oco'nee, a river of Georgia, which rises in the northeastern part of the state, runs in a southern direction and unites with the Ocmulgee River to form the Altamaha. Its total length is about 270 miles, and it is navigable for about 100 miles.

O'Con'nell, DANIEL (1775–1847), an Irish patriot and agitator, born in County Kerry. He was educated at a school in Cork and at the Catholic colleges of Saint Omer and Douai, in France. He was admitted to the Irish bar and soon became distinguished for legal skill and oratory. Turning his energy to politics, he advocated Catholic emancipation and skilfully kept the agitation within constitutional lines. He was elected to Parliament for County Clare in 1828, but was not allowed to take his seat because he was a Catholic and as such could not take the oath required by the Test Act. In the following year, however, he attained his triumph, when the government of the Duke of Wellington granted the Catholic claims. Again he was returned to Parliament, of which he was a member for the remainder of his life. In 1841 he called together enormous meetings throughout Ire-Ireland and raised a cry for the repeal of the union. This agitation Peel and the government determined to put down. They arrested O'Connell, obtained a conviction and sentenced him to twelve months' imprisonment, with a large fine. In a few months the House of Lords reversed this judgment. O'Connell made his last speech in Parliament in April, 1847, and died the following month.

O'Con'nor, THOMAS POWER (1848–), an Irish journalist and politician, born at Athlone, in the County of Roscond, Ireland. Early in life he entered journalism and was employed on several Dublin and London papers. In 1880 he entered Parliament, becoming conspicuous as a member of the radical Irish independence party. The following year he lectured in America, devoting himself to the agitation of the Irish question. In 1883 O'Connor was elected president of the Irish National League of Great Britain and was thereafter elected four times to Parliament. He was also founder and editor of several daily journals.

O'Con'or, CHARLES (1804–1884), an American lawyer and politician, born in New York City. Admitted to the bar in 1824, he soon gained a wide reputation as one of the most brilliant lawyers in the East and as a prominent supporter of the Irish nationalist movement in America. During the Civil War his sympathies were with the South, and he took an active interest in securing legal justice for the leaders of the Confederate cause, signing, with Horace Greeley, the bail bond of Jefferson Davis and voluntarily appearing as his counsel. He was conspicuous in the prosecution of the Tweed Ring and in 1872 was nominated, in spite of his positive refusal, for president of the United States, by the portion of the Democratic party which declined to support Horace Greeley.

Ocon'to, WIS., the county-seat of Oconto co., 30 mi. n. of the city of Green Bay, on Green Bay, at the mouth of the Oconto River, and on the Chicago & Northwestern and the Chicago, Milwaukee & Saint Paul railroads. The city is the business center for a large lumbering region and has a considerable trade in lumber and fish. There are lumber mills, flour mills, a canning factory, a brewery and other works. The city has a public library, a fine courthouse and a high school building. It was settled in 1850 and was incorporated in 1882. Population in 1905, 5722.

O'cracoke Inlet, an inlet of North Carolina, forming a passage into Pamlico Sound, 25 mi. s. w. of Cape Hatteras. On each side of the channel are dangerous shoals.

Oc'tave. See MUSIC.

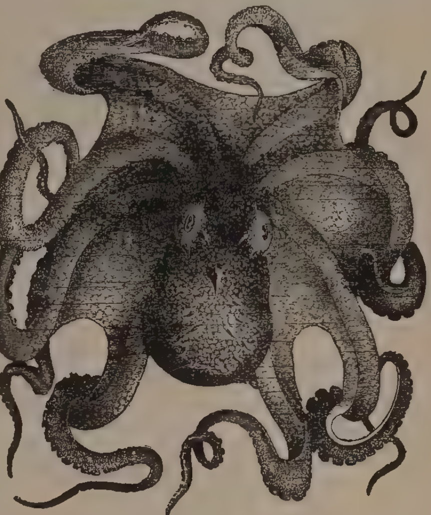
Octa'via, sister to the emperor Augustus, was the widow of Claudius Marcellus, when she was married, at the instance of her brother, to the triumvir, Mark Antony. Antony neglected her for Cleopatra, queen of Egypt, but notwithstanding this, Octavia displayed the most noble fidelity to his house and fortunes and devoted herself to the education of his children. At length he divorced her and ordered her to leave his house, a command she obeyed without complaint. She died in 11 B. C.

Octa'vius or **Octavianus.** See AUGUSTUS.

Octa'vo, the size of one leaf of a sheet of paper folded so as to make eight leaves; used to describe a book having eight leaves to the sheet. It is usually written *8vo.* There are different sizes of octavo, arising from the different sizes of paper used; as *foolscap 8vo, demy 8vo, imperial 8vo.* See BOOK.

Octo'ber, the tenth month of the year, containing thirty-one days. It was the eighth month of the Roman year, and from that fact it takes its name.

Oc'topus, a genus of mollusks, commonly known as cuttlefishes, one of the cephalopods. They have eight arms, each with two rows of suckers. The prominent head is joined to the body by a distinct neck, and the body is short, generally more or less rounded in shape, and unprovided with side or lateral fins. They have attained great notoriety from the stories told of their exceeding ferocity and of the existence of gigantic members of the genus, though the largest cuttlefishes found have not belonged to this eight-armed genus.



OCTOPUS

Odd Fellows, INDEPENDENT ORDER OF, a large friendly society, or fraternal order, whose headquarters were originally in Manchester, England. It assumed its present form at a convention in Manchester in 1813 and has spread widely in Great Britain and elsewhere. The organization was introduced into the United States in 1819 and severed its connection with the British Union in 1843. Branch societies connected with England or the United States have been founded in Canada, Australia, New

Zealand, South Africa and South America. There is a branch of the order for women, known as the Rebekah degree. The total number of Odd Fellows in the United States and Canada is 1,437,235.

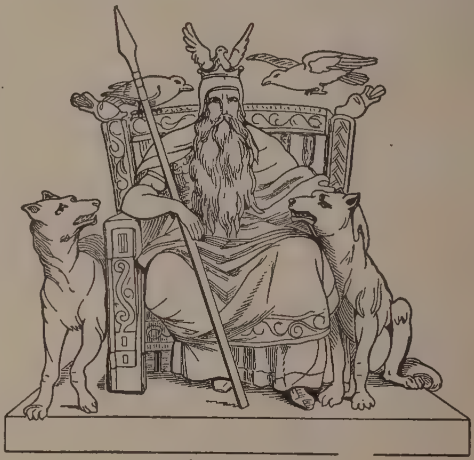
Ode, a poem of a lyrical nature, differing from the song by its more dignified character and by the fact that it is usually addressed directly to some person or thing. The Greeks called every lyrical poem adapted to singing, an ode. The principal ancient writers who employed this form of verse were Pindar, Anacreon, Sappho, Alcaeus, among the Greeks, and Horace, among the Romans. As employed by English writers the ode takes either the Pindaric form of strophe, antistrophe and epode, irregularly arranged and contrasted; or, as in its later development, the form of a regular series of regular stanzas. The former style is found in Dryden's *Ode for Saint Cecilia's Day*, while the latter is seen in Shelley's *Ode to a Skylark*. The English poets who have carried the ode to its highest point of perfection are Milton, Dryden, Collins, Grey, Coleridge, Wordsworth, Keats and Shelley; among the greatest odes in English, besides the two mentioned above, are Wordsworth's *To Duty* and *Intimations of Immortality*; Shelley's *To the West Wind* and *To Liberty*; Keats's *To a Nightingale* and *On a Grecian Urn*; Tennyson's *On the Death of the Duke of Wellington*; Burns's *To a Mouse* and *To a Mountain Daisy*; Bryant's *To a Waterfowl* and Lowell's *Commemoration Ode.*

Odense, *o'den sa*, a seaport town of Denmark, capital of the island of Funen, on the Odense River, near the fiord of the same name. It is a well-built town and has a magnificent cathedral of the thirteenth century and several other notable buildings. Its manufacturing industries, among which are brewing, distilling, glassmaking, sugar refining and the manufacture of machines and textiles, are of great importance. The export trade is considerable. Population in 1901, 40,138.

O'der, a river of Germany which rises in the Odergebirge, flows n., then n. w., and after passing through the Stettiner Haff, empties into the Baltic by three branches. Its length is about 550 miles. The traffic of the river is very important, and the principal towns on its banks are Stettin, Frankfort-on-the-Oder, Breslau and Oppeln. Its chief tributary is the Warthe.

Odes'sa, a Russian seaport in the Government of Kherson, on the Black Sea, e. of the mouth of the Dnieper. It is a well-built city, with broad streets, the most beautiful of which is the Nikolayevsky Boulevard, and a number of noteworthy buildings. The Imperial New Russian University, with almost 2000 students, is located at Odessa, which possesses also a municipal library of about 150,000 volumes. The roadstead is large and deep, but it is dangerously exposed to easterly winds. The shipping, however, is protected in three large harbors, enclosed by moles. Odessa is the greatest shipping point in Russia and is one of the chief wheat ports in the East, while wool, timber, hemp, flax, iron and coal are among the staple exports. A large overland trade is also carried on with Germany, Austria, France, Switzerland and Italy, and there are manufactures of matches, sugar, soap, textiles, leather and chemicals. The city was founded by Catharine II in 1792. Population in 1900, 449,673.

O'din or **Wo'den,** the chief god of Northern mythology, the omniscient ruler of heaven and earth, from whom all the other gods were descended. In Asgard, the home of the gods, he occupied the highest throne, from which he could see over the whole universe. Two ravens sat upon his shoulders, and these he was wont to send throughout the earth to bring him tidings of everything that took place. As a war god he held his court in Valhalla, where brave warriors were carried after death on the battlefield, to enjoy an eternal life of feasting and fighting. In art, Odin is represented as a powerful man of about fifty, usually clad in a


ODIN
From an old manuscript.

long cloak of blue and gray, representing the sky with its clouds. Wednesday received its name from Woden.

Odoacer, *o dō a'sur,* (?–493), the first barbarian king or ruler of Italy after the fall of the Western Empire. He was of German origin, the son of Idico, and received his early training in the camp of Attila, king of the Huns. He afterward journeyed into Italy and joined the imperial guard of the Roman army. He was chosen head of the barbarian confederates, and, having overthrown Romulus Augustulus, the last of the Roman emperors, he assumed the title of king in 476. Out of policy he paid court to the Byzantine emperor Zeno, from whom he received the title of patrician. He ruled with vigor and wisdom. In 489 Italy was invaded by the Ostrogoths under Theodoric; Odoacer was defeated in three battles, and on the fall of Ravenna he was assassinated.

Odysseus, *o dis'use.* See ULYSSES.

Od'yssey, an ancient Greek epic, ascribed to Homer, in which are described the wanderings of Ulysses (called Odysseus by the Greeks) in his return from the Trojan War. At the beginning of his voyage he was wrecked on the coast of Thrace, and in plundering the town of Ismarus he lost many of his followers. Next he was driven to the coast of Libya and thence northward to the goat island. With one ship he sailed to the island of the Cyclops, on the west coast of Sicily. With twelve companions, he entered the cave of the one-eyed monster, Polyphemus, who devoured six of the intruders. Ulysses made Polyphemus drunk with wine, blinded him with a burning pole and escaped with his comrades. Henceforth he was pursued by the wrath of Neptune, whose son the Cyclops was. After losing all his ships but one, he reached an island where dwelt the sorceress Circe, who counseled him to make a journey to Hades. When he left Circe's island he sailed by the island of the Sirens, and after successfully passing Scylla and Charybdis, he reached Thrinacia, the island of Helios. Here his companions killed some sacred oxen, and, consequently, on their next voyage they were all shipwrecked and drowned except Ulysses, who escaped to the island where lived the nymph Calypso, and where he remained eight years. Leaving the island on a raft he was again wrecked, but reached the island of the Phaeacians. The princess Nausicaa and her maidens discovered him, and he was kindly received and cared for by King Alcinous. After a happy sojourn he was sent to Ithaca, and, after slaying the suitors of his wife Penelope, he was gladly welcomed by her and all his subjects. See HOMER, and the names of the principal characters mentioned above.

Oedipus, *ed'i pus,* in ancient Greek legend, son of Laius, king of Thebes. An oracle had foretold that the child should grow up to kill his father, marry his mother and bring destruction upon his city; to prevent this, Laius had the child exposed to die. He was found, however, and given into the care of the king of Corinth, at whose court he grew up. Learning, when he reached manhood, of the fate which was before him, and believing that the king and queen of Corinth were meant in the prophecy, he left the city and wandered off to Thebes. While on the way, he accidentally encountered Laius, whom, in a sudden brawl, he put to death, unconscious, of course, of his identity. He then entered into Thebes, and, having guessed the riddle of the sphinx, he was made king of that city and given, as a wife, the queen, Jocasta. In spite of this fulfillment of the ancient prophecy, Oedipus was for some time very fortunate and happy. Gradually, however, he became aware of the terrible circumstances of his life, which he had not understood before, and in despair he put out his eyes and wandered forth from his city as an outcast. He was faithfully attended by his daughter Antigone. At Colonus he bade farewell to his daughter and entered a dark forest, from which he never afterward emerged. It was believed that he had been carried away by the Furies. Two plays of Sophocles, *Oedipus Coloneus* and *Oedipus Tyrannus*, give part of the story of this unfortunate king. See SPHINX.

Oelwein, *ole'wine,* IOWA, a city of Fayette co., 65 mi. w. by n. of Dubuque, on the Rock Island and several lines of the Chicago Great Western railroad. It is in an agricultural region and contains large railroad repair shops, a foundry and other establishments. It was settled in 1875 by August Oelwein, was incorporated in 1888 and was chartered as a city in 1897. There are nine churches, three banks and a business college. Population in 1905, 5632.

Oeta, *e'tah,* a mountain mass in Greece, forming the southern boundary of Thessaly and separating that country from central Greece. At the eastern extremity is the pass of Thermopylae.

Offenbach, *of'fen baK,* a town of Germany, in the grand duchy of Hesse, 4 mi. e. of Frankfort. It is an important commercial and manufacturing center, its manufactures embracing various chemical products, metal goods, leather and leather goods, paper, soap, jewelry and carpets. Population in 1900, 50,468.

Offenbach, Jacques (1819–1880), a French composer, born of Jewish parents at Cologne. He entered the Paris Conservatoire in 1835, became proficient on the violoncello and for some time played on this instrument in the orchestra of the Théâtre Comique. In 1847 he became conductor of the Théâtre Français and subsequently earned the reputation of being the greatest of all writers of light opera, through his *La Barbe Bleue*, *Vert-vert* and *La Princesse de Trebizonde*.

Og, king of Bashan, at the time of the conquest of Canaan by the Israelites. He and his people were destroyed.

Og'den, Utah, the county-seat of Weber co., 35 mi. n. of Salt Lake City and 10 mi. e. of Salt Lake, on the Weber River, at the mouth of the Ogden, and on the Southern Pacific, the Union Pacific, the Oregon Short Line and other railroads. The city is in a fertile agricultural and fruit-growing section, near the picturesque Ogden Canyon. The falls in the river have been utilized in the development of electrical power, which is used in Ogden, Salt Lake City and other places. The principal industrial establishments are canneries, flour mills, a tin can factory, a beet sugar factory, a large brewery, brickyards and sewer pipe works. An irrigating canal has been constructed, which supplies water to about 150,000 acres of land in the surrounding country, adapted to the raising of fine fruits and berries. The city contains the Weber Stake Academy, Sacred Heart Academy, a state industrial school, and state institutions for the deaf, dumb and blind. There are gas and electric lights and electric street railways. The important buildings include a fine union depot, five banks, a number of wholesale houses and about fifteen hotels. The place was settled about 1848, was laid out under the direction of Brigham Young in 1850 and was chartered as a city in the next year. Population in 1900, 16,313.

Og'densburg, N. Y., a city in Saint Lawrence co., 170 mi. n. w. of Albany, on the Saint Lawrence River, at the mouth of the Oswegatchie River and opposite Prescott, Ont., and on the New York Central and the Rutland railroads. It has a large Canadian trade in grain, lumber, coal and manufactured goods. Water power from the river is utilized, and there are shipbuilding yards, lumber mills and manufactures of silk, flour, gloves and other articles. The city contains five parks, the Ogdensburg Free Academy, a state hospital for the insane, the city and the Saint John's hospitals, an orphanage, a home for the aged and other institutions. The other prominent structures include the fine Federal building, a state armory, the city hall, a public library and a Roman Catholic cathedral. The place was settled in 1749 and was chartered as a city in 1868. Population in 1905, 13,179.

O'glesby, Richard James (1824–1899), an American statesman and soldier, born in Kentucky. He began life as a carpenter, later studied law and was admitted to the bar of Illinois in 1845. He took an active part in the Mexican War, afterward resumed his law practice and went to California in 1849. He returned two years later. In 1860 he was elected state senator, but preferred to join the Union forces in the Civil War. He was made brigadier general and later major general of volunteers and fought at forts Henry and Donelson, Shiloh and Corinth. In 1864 he was elected governor of Illinois and was reëlected in 1872. He served in the United States Senate from 1873 to 1879 and was again elected governor in 1885.

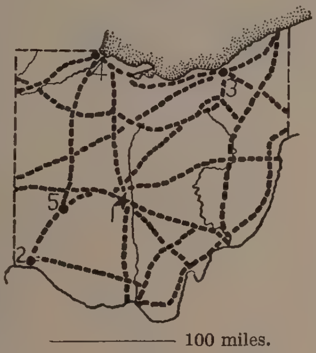
O'glethorpe, James Edward (about 1696–1785), an English soldier, reformer and colonist, founder of the State of Georgia. He was born at London, entered the army, became a member

JAMES E. OGLETHORPE
From an old drawing.

of Parliament in 1822 and headed a commission to investigate imprisonment for debt. The disclosures led Oglethorpe to form a scheme of colonization for the benefit of debtors, and in 1732 he secured a patent to lands in America in the present State of Georgia. He became governor of the new colony and founded the city of Savannah in 1733. During his career in the colony, he displayed exceptional energy, liberality and executive ability and conducted several notable military exploits against the indians and Spanish in Florida. He returned to England in 1743, became a brigadier general and took a prominent part in politics until his death.

Ogowai, *o go way′*, or **Ogové,** *o go vay′*, a river of Africa, the course of which lies chiefly in French Kongo. Its commercial importance is not very great, as its course is much broken by rapids. A number of European trading stations have been established on its banks. Its total length is 700 miles.

Ohi′o, the Buckeye State, situated in the northeast part of the central belt of states. It is bounded on the north by Michigan and Lake Erie, on the east by Pennsylvania, on the east and south by the Ohio River, which separates it from West Virginia and Kentucky, and on the west by Indiana. The international boundary passes through Lake Erie, about midway between the northern and southern shores. The greatest length from east to west is 225 miles; the greatest breadth from north to south is 210 miles, and the total area is 41,060 square miles. In 1900, the population was 4,157,545, of which 96,901 were colored.



OHIO

1, Columbus; 2, Cincinnati; 3, Cleveland; 4, Toledo; 5, Springfield.

Dotted lines indicate chief railroads.

Surface and Drainage. The eastern part of the state belongs to the Appalachian plateau, and the western part belongs to the prairie region. In general, the surface is rolling and contains no mountains, though a few of the highest hills are designated as mountains by the inhabitants of the locality. A height of land, which is a low, flat ridge, extends in an irregular direction across the state, from near the northeastern corner to a point a little north of the middle of the western boundary, and separates the state into two drainage districts, the northern sloping toward Lake Erie and the southern toward the Ohio. To the north of this height of land the surface is more generally level and has a gentle slope toward the lake. The portion to the south is much the larger, and this is deeply cut by streams flowing through it to the Ohio. It is more generally rolling than the northern portion and contains the highest point of land within the state, which is near Bellefontaine, a little west of the center, and has an altitude of 1540 feet. Some of the bluffs along the Ohio have an altitude of 600 feet, or more.

The chief rivers flowing into Lake Erie are the Maumee, in the northwestern section of the state, the Sandusky, the Cuyahoga and the Grand, which is in the northeastern corner. The rivers flowing into the Ohio are longer and larger than those flowing into Lake Erie. From the west eastward these are, in their order, the Great Miami, the Little Miami, the White, the Scioto, the Hocking and the Muskingum.

Climate. The climate is generally healthful, though sudden changes in temperature are frequent and extreme. The constantly varying winds, however, greatly lessen the duration of the extremes. In the north the winters are cold, but they are moderated near the lake shore by the milder temperature of the water; the summers and autumns are temperate and pleasant. In the southern portion the winters are comparatively short and mild, and the snowfall is not heavy; the summers are long and hot. The mean annual temperature in the state is about 51°, and the annual rainfall, about 38 inches.

Mineral Resources. The southeastern part of the state contains coal measures which have an average thickness of 15 feet and an area of 1200 square miles. The coal found is of the bituminous variety and is of excellent quality, and large quantities are mined each year, making Ohio one of the important coal-producing states. Clay suitable for making brick and pottery is widely distributed and gives rise to many important industries. Along the Ohio are a number of large establishments given to the manufacture of pottery, so that the state ranks first in the Union in this industry. Petroleum is found in the southeastern part of the state and also in the northwestern section. The first field is known as the "Eastern," and the second is called the "Lima". The annual production from these fields is about 22,400,000 barrels, placing Ohio first among the oil-producing states. Natural gas is also found in and near the oil fields and has been extensively used, but the supply is diminishing, and some industries which located in this region because of the supply of fuel have moved elsewhere. In the northern part of the state are large quarries of stone suitable for the manufacture of whetstones and grindstones. Granite, limestone, sandstone and other building material are generally distributed over the state.

Agriculture. With the exception of a small area in the southeastern corner of the state, the soil is fertile and well suited to general agriculture. The region sloping toward Lake Erie contains considerable clay that is well adapted to growing wheat. The bottom lands along the rivers are especially suited to corn, while fruits, vegetables, barley, oats, rye and potatoes are generally grown throughout the state. There are large areas suited to grazing, and dairying and the raising of live stock are important branches of industry.

Manufactures. In the value of manufactures, Ohio ranks fifth in the United States. In the manufacture of iron and steel products, Ohio is second to Pennsylvania only. Allied to, and next in importance to, the manufacture of iron and steel is the manufacture of foundry and machine-shop products, of which Cleveland and Cincinnati are the great centers. The industry which ranks third in the state, and in which Ohio ranks third among the states, is flour and grist milling. Of the other leading industries, the production of malt and distilled liquors and of wine from Catawba grapes, the manufacture of lumber and timber products and slaughtering and meat packing are most notable. In the manufacture of stone and earthen ware, Ohio ranks first among the states and produces more than one-fourth of the product of the country.

Transportation. The high degree of development of the manufacturing industries is largely due to the unusually excellent means of water transportation. Ready communication is possible with the Atlantic coast by means of Lake Erie and the Erie Canal; with the states of the northwest through the Great Lakes, and with the Mississippi Valley by means of the Ohio River. Canals extend across the state from Toledo to Cincinnati and from Cleveland, *via* Columbus, to Portsmouth. Besides this system of lakes, rivers and canals, there is a vast system of trunk and local lines of railway in Ohio. Notable among the trunk lines are the Baltimore & Ohio; the Cleveland, Cincinnati, Chicago & Saint Louis; the Erie; the Lake Shore & Michigan Southern; the Toledo and Ohio Central; the Pennsylvania, and the Wabash. The railway mileage is about 9200 miles.

Government. The legislature consists of a senate and house of representatives, the members for each house being apportioned according to population and elected for two years. The legislature meets biennially, and the sessions are unlimited. The executive department consists of the governor, the lieutenant governor, the secretary of state, the treasurer, the attorney-general and the school commissioner, elected for two years, and an auditor elected for four years. The courts consist of a supreme court, circuit courts and courts of common pleas. Each county has a probate court, and justice and other inferior courts are established in towns and cities. The judges are elected by popular vote.

Education. Somewhat less than $18,000,000 is annually expended for public instruction in Ohio, and the state ranks high for its public school system. The state institutions of higher learning are Miami University at Oxford, Ohio University at Athens, the State University at Columbus and Wilberforce University at Wilberforce. Among the oldest and most prominent private colleges and universities are Marietta College at Marietta, Oberlin College at Oberlin, Ohio Wesleyan University at Delaware, Saint Xavier's at Cincinnati, Western Reserve University at Cleveland, Denison University at Granville, Hiram College at Hiram, University of Wooster at Wooster, Wittenberg College at Springfield, Otterbein University at Westerville, Kenyon College at Gambier, Heidelberg University at Tiffin and Buchtel College at Akron. Of those more recently founded, the University of Cincinnati and the Case School of Applied Science at Cleveland are notable.

Institutions. The schools for the blind, the deaf and dumb and the feeble-minded are at Columbus. There are also an industrial home for girls and an industrial school for boys. The hospitals for the insane are at Athens, Cleveland, Columbus, Dayton, Longview and Toledo. The soldiers' home is at Dayton, the soldiers' and sailors' home at Sandusky; the state penitentiary is at Columbus, and the state reformatory is at Mansfield.

CITIES. The chief cities are Columbus, the capital; Cleveland, Cincinnati, Toledo, Dayton, Youngstown, Akron, Springfield, Canton, Zanesville and Sandusky, each of which is described under its title.

HISTORY. Ohio was probably discovered by La Salle, as early as 1670, and the French took formal possession of the whole Northwest in the following year. A few years later conflicting claims arose between the French and the English regarding this territory, which were set at rest by the Treaty of Paris in 1763, by which France surrendered to Great Britain all her lands in the North and West as far as the Mississippi. In 1787 the Ohio Company was organized in New England by soldiers who had served in the War of the Revolution, of whom Manasseh Cutler and Rufus Putnam were conspicuous, and under their auspices a large tract of land was purchased from the government in the territory northwest of the Ohio River. This was the first public sale of land by the United States government. In connection with its sale, the famous Ordinance of 1787 was passed (See ORDINANCE OF 1787).

In 1788 Marietta and Cincinnati were founded, and settlements in the southern part of the territory increased rapidly. Late in 1794 a victory was gained by Gen. Anthony Wayne over the indians, at "Fallen Timbers" on the Maumee River, and the next year a treaty of peace was concluded, the indians ceding a great portion of the territory, which settlers began at once to fill. Chillicothe was made the seat of government for the territory; the legislature first met in 1799 and sent W. H. Harrison as delegate to Congress. Indiana was set off from Ohio in 1800, and in 1802 a constitution was adopted for the latter. On Feb. 19, 1803, Ohio was admitted into the Union. Ohio took an active part in the War of 1812. In the Civil War, the state supplied many times its quota of troops to the Federal army, although there was a strong Southern sentiment in many parts of the state. Because of the many waterways leading to Ohio and its varied natural resources, the course of western immigration set toward the state and built it up rapidly. Consult Rufus King's *Ohio*, in the American Commonwealths Series.

Ohio River, a river formed at Pittsburg, Pa., by the confluence of the Allegheny, from the n., and the Monongahela, from the s. At its formation it is a navigable stream 600 yards wide. It flows first northwest, then southwest, separating Ohio from West Virginia, and in its further course it separates Kentucky on the south from Ohio, Indiana and Illinois. It enters the Mississippi at Cairo, Ill., after a course of almost 1000 miles. Its drainage basin is estimated at about 210,000 square miles. The river is navigable from Pittsburg to Cairo except in the extreme dry season and in the coldest winter weather. The principal tributaries are the Muskingum, the Miami, the Wabash, the Great Kanawha, the Big Sandy, the Licking, the Green, the Cumberland and the Tennessee rivers. Among the towns on its banks are Pittsburg, Pa., Wheeling, W. Va., Marietta, Ohio, Covington, Ky., Cincinnati, Ohio, Madison, Ind., Louisville, Ky., Evansville, Ind., Paducah, Ky., and Cairo, Ill.

Ohio State University, THE, a state institution of higher learning at Columbus, Ohio, founded in 1870 as the Ohio Agricultural and Mechanical College. It was given its present name in 1878. The university comprises six colleges, namely, agriculture and domestic science; arts, philosophy and science; engineering; law; pharmacy, and veterinary medicine. It has a faculty of about 150, an attendance of over 2000 and a library containing 70,000 volumes.

Ohm, *ome.* Every conductor offers a certain degree of resistance to the flow of the electric current, in much the same way as the size and friction of a pipe resist the flow of water through it. The ohm is the unit employed in measuring electrical resistance. It is equivalent to the resistance offered by a column of mercury whose mass is 14.4521 grams, whose cross section is one square millimeter and whose length is 106.3 centimeters, at the temperature of melting ice. In common terms, this means a column of mercury the size of that found in an ordinary thermometer tube 40.84 inches long, at a temperature of 32° F.

Ohm, GEORG SIMON (1787–1854), a German physicist. He became successively professor of physics at Cologne, director of the Polytechnic at Nuremberg and professor of physics at the University of Munich. He was the discoverer of what is known as "Ohm's Law" in electricity, and he wrote important scientific works.

Ohm's Law, an important law in electricity, deduced by Professor Ohm, to the effect that the intensity of the electric current is directly proportional to the whole electromotive force in operation and is inversely proportional to the sum of the resistances in the circuit. See ELECTRO-MOTIVE FORCE.

Oil City, PA., a city in Venango co., 132 mi. n. of Pittsburg, on the Allegheny River, at the mouth of Oil Creek, and on the Lake Shore & Michigan Southern, the Pennsylvania and the Erie railroads. It is the center of the great oil region of western Pennsylvania and has large refineries, barrel works, foundries, machine shops and manufactures of boilers, engines, oil well supplies and other articles. The principal buildings include a Carnegie library, a city hospital, a high school and the Oil Exchange. The place was settled about 1825, became prominent with the development of the oil fields after 1859 and was chartered as a city in 1874. On the fifth of June, 1892, burning oil swept down the creek from Titusville and destroyed over one hundred lives and more than a million dollars' worth of property. Population in 1900, 13,264.

Oilcloth, a floor covering made of coarse canvas, filled with a thick oil paint and coated on both sides. The canvas is sized by drawing it through a mixture of glue, rye flour, tobacco or varnish, after which it is dried, rubbed down with pumice stone and painted. After painting, the ornamental design is placed upon the surface. Oilcloths are made in varying widths and in a number of grades. The more durable grades make a very desirable floor covering for offices and rooms where the floors need to be cleaned by washing. See Linoleum.

Oil Palm, one of several species of African palms, closely resembling the cocoanut palm. They yield a palm oil. See Palm Oil.

Oils, sticky or viscid substances formed within living animal or vegetable organisms, liquid at ordinary temperatures, insoluble in, and lighter than, water, taking fire when heated in air and burning with a more or less luminous flame. The oils are usually divided into the fat, or fixed, oils, and the volatile, or essential, oils. Another division recognizes vegetable oils, by far the most numerous, animal oils and the mineral oils (petroleum, naphtha).

Fat, or *fixed, oils* are subdivided into the *drying* and the *non-drying oils*. The former class includes all oils which, through the absorption of oxygen, thicken when exposed to the air and are converted thereby into varnish, as, for example, linseed and hemp-seed oil. The most important of the drying oils are linseed, hemp, walnut, poppy, candle nut, sesame, sunflower, madia and safflower. All the drying oils are of vegetable origin. The *non-drying* oils (partly of vegetable, partly of animal origin) when exposed to the air also undergo a change, resulting in the formation of acrid, disagreeably smelling substances, which, though they thicken, do not become dry. The fixed vegetable oils are generally prepared by subjecting the seeds of the plant to pressure, with or without heat, but they may also be extracted by means of certain solvents. Of the non-drying oils the chief are olive, cottonseed, colza, rape, ground nut, castor and croton.

Volatile oils are generally obtained by distilling with water the plants which afford them. They are acrid, caustic, aromatic and limpid and are mostly soluble in alcohol, forming essences. They boil at a temperature considerably above that of boiling water, some of them undergoing partial decomposition. A few of them are hydrocarbons; the greater number, however, contain oxygen as one of their elements. They are chiefly used in medicine and in the manufacture of perfumery; and a few of them are extensively employed in the arts, as vehicles for colors, and in the manufacture of varnishes, especially oil of turpentine. They are very numerous, among them being the oils of anise, bergamot, clove, cinnamon, cajeput, lavender, lemon, lime, orange, mint, peppermint, nutmeg, marjoram, rosemary and thyme.

Animal oils are, for the most part, the fluid parts of the fat of the animal and are separated by heat alone. The animal oils comprise neat's foot oil, train oil, seal oil, sperm oil, porpoise oil, cod-liver oil and shark oil. Many are used as articles of food, some are medicines and some are used extensively in the arts. *Vegetable fixed oils* all consist of one or more peculiar principles. Thus, olive oil contains chiefly olein, with a little stearin; linseed oil is composed mainly of linolein. A certain number of the vegetable oils are also known as vegetable fats, from their consistency at ordinary temperatures, such as palm oil, cocoanut oil, shea-butter.

Ojib'wa or **Chip'pewa,** a once important tribe of indians, distributed in bands round both sides of the basin of Lake Superior, where they owned vast tracts. They were of the Algonquian stock, tall, active and well formed, and subsisted chiefly by hunting and fishing. They now number about 30,000.

Okapi, *o kah'pe*, a giraffe-like animal, which was found for the first time in 1899, in the forests of the Kongo valley. It is about four feet tall at the shoulders, has a shorter, thicker neck than the giraffe and is without horns. The body, neck and forehead range from black to sepia brown. The nose is sepia, and the cheeks and jaws are of a yellowish white. The animal lives in the midst of dense forests, where it is hunted by the dwarfs.

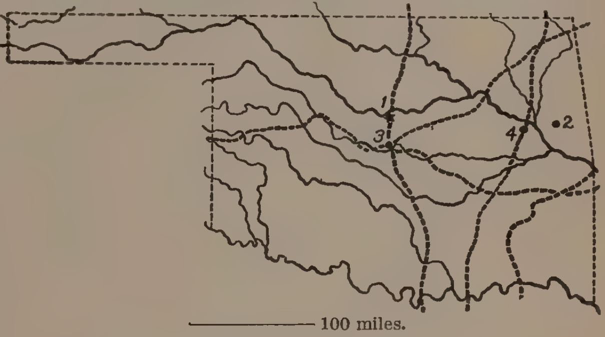
O′keecho′bee Lake, a large, shallow lake in southern Florida. It is about 40 miles in length by 25 in breadth and has a maximum depth of 12 feet. Its waters are discharged through the Everglades, but there is no appreciable outlet stream. It contains a few low islands.

Okhotsk, *o kotsk′*, Sea of, an inlet of the North Pacific Ocean, bounded on the n. by Russian Siberia, on the e. by Kamtchatka, and partly enclosed by the Kurile Islands on the south. The coasts are only thinly inhabited.

O′klaho′ma, the Boomer State, situated in the south central part of the United States, bounded on the n. by Colorado and Kansas, on the e. by Missouri and Arkansas, on the s. by Texas and on the w. by Texas and New Mexico. The length from east to west is about 310 miles; the length of the eastern boundary is 213 miles, and the western boundary is 170 miles. The area is 70,430 square miles, of which 600 square miles are water. The dimensions of length and breadth here given do not take into account the western prolongation of the state, generally known as "No Man's Land" and now constituting Beaver County.

Surface and Drainage. The northeastern part of the state north of the Arkansas and Canadian rivers is a plateau deeply cut by the streams which flow across it. In the central part of this plateau, those portions occupied by the Cherokee and Creek nations, there is considerable open prairie country. The southeastern part of the state, south of the Canadian River, is broken by hills, which enter it from Arkansas. These vary in altitude from 2500 feet, on the Arkansas border, to about 1000 feet, in the south central part of the state. The hills and intervening valleys of this section are quite heavily wooded. From the central part of the state westward, the surface consists almost wholly of a rolling plateau, rising from an altitude of 800 feet, in the center of the state, to 2500 feet, on the northwestern boundary, and 5000 feet, in the extreme western part of Beaver County. The western part of the state properly belongs to the region of the great plains.

Oklahoma is watered by the Arkansas River, which flows across the northeastern portion, and its leading tributaries, chief of these being the Canadian, which enters the state near the middle of its eastern boundary and flows easterly, uniting with the Arkansas a few miles west of the eastern boundary. The North Fork of the Canadian enters the state at Beaver County and flows in an easterly-southeasterly direction until it unites with the main stream a few miles west of its confluence with the Arkansas. North of the North Fork is the Cimarron, flowing nearly parallel with it, and in the northeastern corner are the Verdigris and Neosho rivers, flowing southerly into the Arkansas. The most important stream in the southern part of the state is the Washita, which unites with the Red a little east of the midway point of the southern boundary. The Red River and its minor tributaries drain the southern part of the state, and this stream forms most of the boundary between Oklahoma and Texas. There are no lakes of importance.



OKLAHOMA

1, Guthrie; 2, Tahlequah; 3, Oklahoma; 4, Muscogee.
Dotted lines indicate chief railroads.

Climate. The climate is warm temperate, but in general it is mild, both summer and winter, though in the midst of the summer, periods of extreme heat occur, during which the thermometer has been known to rise as high as 115°. Severe cold is seldom known. The winters are mild and salubrious. In general the mean temperature for July is about 81°, and for the entire year, about 60°. The rainfall for the state averages a little over 31 inches, though in some places it is 57 inches. It is quite evenly distributed throughout the year, and except in the extreme western part, is sufficient for successful agriculture. In the western third of the state and the prolongation forming Beaver County, irrigation is essential to the successful growing of crops.

Mineral Resources. Considerable coal is found in the south central part of the state, in the reservation of the Chickasaw Nation, and the output of the mines is about 3,050,000 short tons a year. There are also deposits of gypsum of considerable value, quarries of granite and limestone and vast fields of petroleum and natural gas, which are rapidly being developed. Coal is the most important mineral product, and most of that mined is shipped to the states south.

AGRICULTURE. Oklahoma has excellent agricultural advantages, including a fertile soil, a salubrious climate and plenty of rainfall. The state is noted for the great variety of products which can be successfully grown. Among the cereals corn takes the lead, and in 1905 the entire crop amounted to 110,442,368 bushels. Wheat and oats are also important crops, but in money value, cotton is next to the corn, and the output for the entire state for 1904 (then Oklahoma Territory and Indian Territory) was 811,268 bales of 500 pounds each. Vegetables and fruits are also extensively grown. In the western part of the state the raising of live stock receives more attention than tilling the soil, and here large numbers of cattle, horses, mules, sheep and swine are raised and marketed.

MANUFACTURES. The manufacturing industries are in a formative stage, but are being rapidly developed. In the indian reservations many hand-made goods, such as baskets, blankets and moccasins, are produced, and in the wheat-growing regions there are numerous flour mills. In the cotton region, which includes all of the southern half of the state, are numerous cotton gins and mills for the manufacture of cottonseed oil and oilcake. Lumbering is quite extensive in the south central part of the state, in the Chickasaw reservation, where also there is considerable manufacturing of other sorts.

TRANSPORTATION AND COMMERCE. Trunk lines of railway traverse the state from east to west, from north to south and from northeast to southwest. Railways had been constructed through the region before Oklahoma was opened to settlement and were pioneers in the development of the territory. In all, in 1905 the state had 5143 miles of railway and all important towns were on one or more lines. The important railway centers are Muscogee, South McAlester, Ardmore, Oklahoma City, Guthrie and Enid. The rivers are not navigable, and inland towns rely upon carriage roads for finding an outlet to the railways. The commerce of the state, considering its population and very recent development, is unusually large. The exports consist of corn, cotton, live stock and lumber, together with other agricultural products, while the imports are almost entirely of manufactured goods.

POPULATION. In 1900 the population of the two territories, Oklahoma and Indian Territory, was 639,177. Of this number, 336,497 were in Oklahoma, and 302,680 were in Indian Territory. Since that date the white population has been very materially increased. In Indian Territory there were, in 1900, 52,510 indians and 36,870 negroes. The increase in population has been caused by the immigration of whites, and the negro and indian population remains nearly stationary. Most of the indians belong to the Five Civilized Nations, the Cherokee, the Chickasaw, the Choctaw, the Creek and the Seminole (See *History*, below). Besides these, there are several other tribes on reservations, including the Modoc, the Osage, the Ottawa, the Seneca, the Shawnee and the Wyandotte.

CITIES. The chief cities are Guthrie, the capital; Oklahoma City, Ardmore, Muscogee and Enid.

EDUCATION. On the organization of the territory, Oklahoma established an excellent system of public schools and reserved two sections of land from each township, the income from which should go toward the creating of a public school fund. This fund is supplemented by county funds, district taxes and from other sources. The public school system includes primary schools, high schools in cities and large towns and in counties having 6000 or more inhabitants; also two normal schools, at Edmond and at Alva. The higher institutions of learning include the University of Oklahoma at Norman, the agricultural and mechanical college at Stillwater and Langston University for colored youth at Langston. Separate public schools are also maintained for colored children. There are, in addition to the state institutions, a number of denominational schools throughout the territory. The educational system in the portion of the state that was formerly Indian Territory has until somewhat recently been entirely in the hands of the civilized tribes or of missionaries. Each of these nations has maintained a public school system, but the inefficiency in management led to poor results, and the political status of white settlers within the nations was such that their children were deprived of school advantages. The government, therefore, in 1898 provided a public school system, and a territorial superintendent of education was placed in charge of the schools. Each nation maintains a number of institutions of academic rank, some of which are sufficiently advanced to prepare their pupils for entrance to eastern colleges. Under the enabling act the schools of this part of the state, with those of Oklahoma proper, are merged in one state system (See FIVE CIVILIZED TRIBES; INDIAN, EDUCATION OF THE).

INSTITUTIONS. The deaf and insane of the state are cared for by contract in private institutions, and convicts are cared for in the Kansas state penitentiary.

HISTORY. The region included within the bounds of Oklahoma was set apart in 1832 as a residence for the indian tribes who were removed from the southern states, with the guarantee that within this domain they should be allowed to exercise their tribal form of government and remain undisturbed. Most of these tribes inaugurated forms of government similar to the governments of the states, but the region assigned was much larger than they could occupy with profit, and several attempts were made by white adventurers to settle upon the portion of the territory that afterwards was erected into Oklahoma Territory. Since this could not be done without gaining the consent of the indians, this portion of the region was purchased from them by the government and in 1889 was thrown open to settlement. The opening of Oklahoma Territory witnessed the most remarkable rush for land ever known in this or in any other country. More than 50,000 people entered the territory and filed claims on the day of the opening. Cities arose in a night, and the next year the territory was organized. From the date of opening, Oklahoma continued to prosper, and her increase in wealth and population was beyond all expectation. Just before the final adjournment of the Fifty-ninth Congress, in 1906, an enabling act, combining Oklahoma and Indian Territory and providing for their admission into the Union as one state, was passed. The new state was admitted by proclamation of the President Nov. 16, 1907. This does no violence to the indian tribes within the state, since, in accordance with a previous arrangement with the government, tribal relations ceased in Indian Territory in 1906.

Oklahoma City, OKLA., the county-seat of Oklahoma co., 31 mi. s. of Guthrie, on the North Fork of the Canadian River and on the Atchison, Topeka & Santa Fé, the Chicago, Rock Island & Pacific, the Saint Louis & San Francisco and other railroads. Oklahoma County and the surrounding country is a fertile agricultural region, producing wheat, corn, cotton, broom corn, alfalfa, fruits, grapes, cattle and hogs. The city has a large and rapidly growing trade and contains flour mills, ice factories, packing houses, breweries, foundries, grain elevators, cotton gins, oil mills and compresses, brickyards and other factories. Epworth University is located here, and the city has a Carnegie library, good public schools and more than a score of churches. There are nine banks, a number of hotels, two theaters and a large summer theater. The principal business streets are paved with asphalt, and the city has two gas plants, electric lights and municipal waterworks. Population in 1900, 10,037. The place has grown very rapidly since 1900, and the population was estimated in 1905 at 30,000.

Öland, *ö lahnd,* or **Oeland,** an island in the Baltic Sea, off the southeast coast of Sweden, forming part of the Län of Kalmar. Its area is about 510 square miles. The inhabitants are engaged chiefly in rearing cattle and sheep and in fishing. The island has alum works of considerable size. The principal town is Borgholm, the capital. Population in 1900, 30,408.

Oldenburg, *ole'den boorK,* a grand duchy in the northern part of Germany, consisting of three distinct territories—the duchy of Oldenburg, the principality of Lübeck and the principality of Birkenfeld. The total area is 2479 square miles, of which the duchy of Oldenburg constitutes seven-eighths. The duchy of Oldenburg is bounded on the north by the North Sea, on the east by Hanover and Bremen and on the south and west by Hanover. The country is flat, the soil marshy and sandy, with little of it under cultivation and with large tracts of heath and forest. The chief river is the Weser. The principal crops are cereals, hay, potatoes, beans and rape. Stock breeding is extensively carried on, and there are manufactures of tobacco, corks, knit goods, linoleum and brick. The constitution of the grand duchy of Oldenburg provides for a representative house of one chamber, which ordinarily assembles every three years. The principalities of Lübeck and Birkenfeld have separate provincial councils. The grand duchy is represented by one member in the Bundesrath and three in the Reichstag. The capital of the grand duchy is Oldenburg. The first count of Oldenburg of whom there is any record lived in the thirteenth century. In the fifteenth century a count of Oldenburg became king of Denmark, and two centuries later Oldenburg came into the possession of the crown of Denmark. In 1777 the state was made a duchy, and in 1815 it was raised to the rank of a grand duchy and given increased territory. It became a part of the German Empire in 1871. Population in 1900, 399,180.

Old Forge, Pa., a borough in Lackawanna co., 4 mi. s. w. of Scranton, on the Lackawanna River and on the Delaware, Lackawanna & Western railroad. The mining of anthracite coal is the principal industry, but there are also chemical and fertilizer works, a silk mill and a glass factory. The borough has a fine high school building. It was settled in 1830 and was incorporated in 1899. Population in 1900, 5630.

Oldham, *old'am,* a town of England, in Lancashire, 7 mi. n. e. of Manchester. The spinning and weaving of cotton are the staple industries and engage within the town and its vicinity about 300 mills. There are also machine shops, foundries, tanneries, silk factories and wool-weaving works. Population in 1901, 137,246.

Old Ironsides. See Constitution, The.

Old Point Comfort, a favorite watering place of Virginia, situated at the mouth of the James River, near the southern end of Chesapeake Bay, and 14 mi. n. of Norfolk. It is on the Chesapeake & Ohio and the New York & Philadelphia railways. Because of its equable temperature, being cool in summer and warm in winter, this is one of the most desirable resorts on the Atlantic coast, and it is frequented by large numbers of tourists.

Old Red Sandstone, the name of an extensive group of rocks found in Scotland and Wales, where the formations reach a thickness of from sixteen to twenty thousand feet. The rocks are shales, conglomerates and red sandstones, the last of which is so prominent as to give the system its name. In the present geological classification, the old red sandstone is known as the Devonian system. It was this formation that Hugh Miller made famous in his works, *The Old Red Sandstone* and *Footprints of the Creator.* See Devonian System.

Old South Meeting House, a famous church built in Boston about 1730, on the site of a former church built in 1669 on land formerly owned by John Winthrop. During the pre-Revolutionary period, the church was the scene of many notable public gatherings, and during the siege of Boston it was used as a riding school by the British soldiers. It now serves as a museum of historical relics and as a hall for lectures upon historical and patriotic subjects.

Old Town, Me., a city in Penobscot co., on the Penobscot River, 12 mi. above Bangor, and on the Maine Central and the Bangor & Aroostook railroads. It is an important lumbering center and contains manufactures of wood pulp, canoes, boots, shoes, woolens, medicines, chemicals and other articles. The city has a public library and a hospital, and the other prominent buildings include the city hall, the high school and Odd Fellows Block. It was settled in 1820 and was chartered as a city in 1891. Population in 1900, 5763.

Olean, *o le an',* N. Y., a city in Cattaraugus co., 70 mi. s. e. of Buffalo, on the Allegheny River, at the mouth of the Olean Creek, and on the Erie, the Pennsylvania and other railroads. It is in a region containing oil fields and hemlock and other forests; and it has oil refineries, tanneries, lumber mills, railroad shops, glassworks, flour mills and other factories. The city contains the Foreman Library, a fine high school building, a hospital, a state armory and a city park. Many famous races have been run in the driving park here. Another feature of interest in the vicinity is the massive collection of conglomerate rocks known as Rock City. The place was settled in 1804 and was chartered as a city in 1893. Population in 1905, 10,163.

Oleander, a plant known, also, by the name of *rose bay,* a beautiful evergreen shrub, belonging to the dogbane family. It produces large pink or white, rose-like flowers in clusters and has thick, shining leaves. The plant, especially the bark of the root, is medicinal and poisonous.

Oleaster, *o le as'tur,* also called wild olive tree, a small tree of the south of Europe and west of Asia, often cultivated in English gardens and shrubberies, especially for its blossoms, which are very fragrant. It grows to a height of fifteen or twenty feet and flowers in May.

Ole'fiant Gas, the name originally given to ethylene, or heavy carbureted hydrogen. It is a compound of carbon and hydrogen and is obtained by heating a mixture of two measures of sulphuric acid and one of alcohol. It was discovered in 1796. It is colorless, tasteless and combustible, and it has an aromatic odor, not unlike that of oil of caraway.

O'leic Acid, an acid resulting from the action of olive and some other oils upon potash. It enters largely into the composition of soaps, forming, with potash, soft soap and with soda, hard soap.

Oleomargarine, *o'le o mahr'ga rin,* a fat made from suet, oil, butter, milk and cream and used in the place of butter. In the process of manufacture the leaf tallow of beef is thoroughly cleansed and cooled, then cut into small pieces and cooked in a temperature of about 150°. After cooking, the fat is allowed to cool for a day, when it is placed in a powerful press, which forces out the oil. This is called oleo-oil. This is one of the purest fats, is of a slightly yellowish color and has an agreeable taste. When oleomargarine is desired, this oil is mixed with proper proportions of thin milk and cream, and the entire mixture is churned for about ten minutes. The compound is then worked, salted and packed ready for market.

Butterine. Butterine is a variety of oleomargarine, in which leaf lard is mixed with the oleo-oil and a small quantity of finely chopped leaf is added to the compound of oleo, fat, butter and cream. Butterine is of better quality than oleomargarine and is used quite extensively in the place of butter.

While oleomargarine and butterine are fully as digestible as butter, their manufacture has for many years been opposed by farmers and dairymen on the ground that they reduce the price of butter. Because of this influence, Congress has from time to time taxed manufacturers of these products, and in 1902 the tax was increased to ten cents a pound for all oleomargarine or butterine colored to resemble butter. The same tax was also extended to all renovated butter. Most of the oleomargarine produced in the United States is manufactured by the large packing houses. See Butter.

Olfac'tory Nerve. See Smell.

Oligarchy, *ol'i gahr ky.* See Government.

Oligocene, *ol'i go seen,* **Epoch,** the name given by European geologists to that portion of the Tertiary period extending from the Eocene to the Miocene epoch. In the United States this term is little used. See Eocene Epoch; Miocene Epoch; Geology; Tertiary Period.

Oliphant, *ol'e fant,* Laurence (1829–1888), an English traveler and writer. He studied law at the University of Edinburgh, traveled extensively in southern Russia and the Crimea, became private secretary to Lord Elgin when he was governor-general of Canada, and subsequently accompanied him (1859) on his mission to China and Japan. Returning to Europe, he became Paris correspondent to the *Times*; entered Parliament in 1865, but retired three years later, and, after his attempt to found a Socialistic religious community had failed, resided principally in Palestine, near Mount Carmel. Besides frequent contributions to periodical literature, he published *Journey to Khatmandu*; *The Russian Shores of the Black Sea*; *Patriots and Filibusters*; *Piccadilly*, a novel; *Traits and Travesties*; *Altiora Peto*, and *Scientific Religion.*

Oliphant, Mrs. Margaret (1828–1897), an English writer, born at Wallyford, Scotland. She was married to her cousin, Francis Oliphant, but he died seven years after the marriage, and Mrs. Oliphant, left with three children, turned to novel writing as a means of support. She produced a large number of novels, all of which are of careful workmanship. None of them, however, can rank as truly great fiction. Among her works are *The Chronicles of Carlingford*, which include *The Rector and the Doctor's Family* and *Salem Chapel*; *A Widow's Tale*; *A Little Pilgrim in the Unseen*, and *Harry Joscelyn.* Of the works of Mrs. Oliphant which are not fiction may be mentioned *The Makers of Florence*; *The Makers of Modern Rome*; *The Literary History of England from 1790 to 1825*, and *The Victorian Age of English Literature.*

Olive, a fruit tree, of which there are several species. The common olive is a low, branching, evergreen tree, from twenty to thirty feet high, with stiff, narrow, dusky-green or bluish leaves. The flowers are small and white and appear in June, July or August. The fruit is a plum-like berry, with a thin, smooth skin and a hard stone, surrounded by a soft, greenish pulp. This tree is a native of Syria and other Asiatic countries, but it is now cultivated in almost all warm, dry parts of the world. It grows slowly and lives for a long period of time. As its age

OLIVE

increases, the trunk becomes gnarled, broken and twisted into odd shapes and even appears on the verge of death, but it still continues to produce great quantities of fruit. The wood is yellowish, beautifully streaked with dark lines, and can be brightly polished. It is serviceable in making boxes and small fancy articles. From earliest times the olive tree has been held in veneration throughout the East. Among the Greeks it was sacred to Minerva, and olive wreaths were used by both Greeks and Romans to crown victors. The olive tree is associated with the garden of Gethsemane and with many of the scenes described in both the Old and the New Testaments. To this day it is recognized everywhere as the symbol of peace.

Olive Oil, an oil extracted from the fruits of the olive tree. In the preparation of this the olives are taken, as soon as picked, to a press, where they are run through a machine which crushes them into fine pulp. This is packed into short, open-mouthed baskets of rushes, several of which are put together into a press, which squeezes out the oil into tubs half filled with water. The oil remains at the top, and the impurities sink through the water to the bottom. The pulp is gathered together after passing through the press the first time and is usually sent through three times more, each successive pressure producing oil of a different grade. The oil is filtered and clarified until it becomes a beautiful golden-yellow, when it is considered suitable for the table. As a matter of fact, much that is sold under the name of olive oil is peanut oil or cottonseed oil or badly adulterated olive oil. California has become one of the greatest olive-producing regions in the world.

Olives, MOUNT OF, or **Mount Olivet,** a hill on the east side of Jerusalem, from which it is separated by the valley of Jehoshaphat and the brook Kedron. The principal summit has the name Mount of Ascension, and here stands the modern Armenian Church of the Ascension. But according to the Scriptures the scene of the ascension was near to Bethany (*Luke* XXIV, 50), which is on the farther side of the hill from Jerusalem. A short way above Bethany is a nearly flat part of the hill, on which hundreds of people might congregate, and it is here, it is said, that Christ ascended into heaven. At the foot of the hill lay the Garden of Gethsemane, and round its eastern and southern side is the road by which Christ made his triumphal entry into Jerusalem.

Olla Podrida, *ohl'ya po dre'da,* the name of a favorite article of food in Spain. It consists of a mixture of all kinds of meat, cut into small pieces and stewed with various kinds of vegetables. Hence, the term is also applied to any incongruous mixture or miscellaneous collection.

Olmsted, *om'sted* or *um'sted,* FREDERICK LAW (1822–1903), an American landscape architect, born at Hartford, Conn., educated at Yale University and Amherst College. He first engaged in farming, but, after several trips to Europe and through his own country, he was appointed landscape architect and superintendent of Central Park, in New York City. During the Civil War he was secretary of the United States Sanitary Commission, and by his personal visits to the camps and his tireless efforts in all directions he succeeded in instituting many measures for the relief of the sick and wounded and for the comfort of the soldiers in the field. He assisted in planning many of the largest parks in the country, including several in New York, Brooklyn, Boston, Montreal, Chicago and Milwaukee, as well as the terraces and grounds of the United States Capitol and several important features of the grounds of the World's Columbian Exposition in Chicago. He was the author of many valuable books upon agricultural methods and upon special phases of landscape gardening.

Olmütz, *ohl'müts,* a city of Austria-Hungary, in Moravia, 40 mi. e. of Brünn, on the March River, which forms almost a complete circle around it. It has a medieval cathedral and other notable churches and an old town hall, which is used as a historical museum. Among the industries are brewing, distilling, milling and the manufacture of chemicals. Olmütz was formerly the capital of Moravia, and it is still the seat of an archbishop. It was once one of the strongest fortresses in Austria, but the site of its former fortifications is now occupied by parks and boulevards. Population in 1900, 21,933.

Ol'ney, RICHARD (1835–), an American statesman, born in Oxford, Mass. He graduated from Brown University at the age of twenty-one and studied law at Harvard for three years. He was elected to the Massachusetts legislature in 1874 and was a candidate for attorney-general on the Demorcatic ticket, but he confined himself chiefly to private practice, where he gained a wide reputation. He was appointed attorney-general of the United States by President Cleveland in his second term, and in this office he gained fame for his successful effort to break the Pullman strike in Chicago in 1894 by the use of a Federal injunction. Olney became secretary of state in 1895, on the death of Secretary Gresham. He conducted the negotiations leading to the arbitration of the British-Venezuela controversy and caused wide comment by his firm and vigorous letter of instructions to Ambassador Bayard at London. He was several times much talked of as a possible candidate for the presidency on the Democratic ticket.

RICHARD OLNEY

Olym'pia, a valley in Elis, Greece, the scene of the famous Olympic games. Here were collected thousands of statues of the gods and of victors in the games, treasure houses full of votive offerings, temples, altars, tombs—in short, the most precious treasures of Grecian art. Among the buildings were the great temple of Zeus, containing the colossal statue of the god, by Phidias, and considered one of the seven wonders of the ancient world; the temple of Hera, the oldest building at Olympia; the twelve treasure houses, and the building in which the Olympic victors dined after the contests (See Olympian Games). These were all surrounded with walls. Recent excavations have brought to light numerous valuable fragments of sculpture, bronzes, coins and terra cottas. The most important of the sculptures found there is the *Hermes* of Praxiteles.

Olympiad, the period of four years between each celebration of the Olympic games, by which the Greeks computed time. The first recorded Olympiad began in 776 B. C.

Olym'pian Games, the most prominent and elaborately observed of all Greek festivals, celebrated in honor of Zeus, on the plain of Olympia. The "Sacred Grove," containing the sanctuaries connected with the games, enclosed a beautiful spot 660 by 580 feet in extent, adorned with temples, monuments, altars and theaters, and was crossed by a road called the Pompic Way, along which all the processions passed. Here was located the Olympium, dedicated to the Olympian Zeus. The place also contained a colossal statue of the god, the masterpiece of the sculptor Phidias. At first, only the Peloponnesus patronized the Olympian games, but gradually the other Greek states joined in them. Originally none but those of pure Hellenic blood were permitted to participate in them, but after the conquest of Greece by the Romans the competition became general, and Roman emperors figured among the lists of victors. The games consisted of running, wrestling and other athletic exercises, and the victor was crowned with garlands and honored with triumphal processions. See Olympiads.

The revival, in 1896, of the Olympic games, after a cessation of exactly 1500 years (the edict forbidding them having been issued by the emperor Theodosius in 396), was an event of historic interest and gave the modern Greeks a coveted opportunity to compete with other nations in the field of athletics. The members of the royal family of Greece participated in the festivities and engaged in the competition for prizes, while the king in person distributed the awards. The stadium erected was an exact reproduction of that of Herodius Atticus, and the arena was capable of seating 70,000 spectators. Among the performances was a long-distance foot-race from Marathon to Athens, for which a special amphora, or cup, was given, in memory of the plucky runner of old, who died in bringing to Athens the news of the rout of the Persians. Bicycle, rowing and swimming races and other athletics and aquatic sports constituted the program. It was decided to make these great meetings an established feature of international life, and accordingly games were held at Paris in 1900 and at Saint Louis in 1904. The next revival should have been held in 1908, but the Greeks anticipated the time, and the games were closed at Athens on May 2, 1906. Here the United States won the meet with 75 points, Great Britain and her colonies standing second with 39 points, and Greece and Sweden tied for third place, with 38 points.

Olym'pus, the name given by the ancients to several mountains or mountain chains. There was one in Mysia, one in Cyprus and one, the most famous of all, between Thessaly and Macedon. This, which reached a height of over 9700 feet above the sea level, was the highest mountain in Greece and was in early times regarded as the home of the gods. In after times, however, when the ideas of men were enlarged, the gods were regarded as dwelling, not on the top of the mountain but in a region above it, to which was also given the name of Olympus.

Olyphant, *ol'e fant,* PA., a borough in Lackawanna co., 5 mi. n. e. of Scranton, on the Lackawanna River and on the Delaware & Hudson and the New York, Ontario & Western railroads. Mining and shipping of anthracite coal are the principal industries, and there are also powder mills, machine shops and iron works. It was settled in 1857 and was incorporated in 1877. Population in 1900, 6180.

Omaha, *o'ma haw,* a large tribe of Siouan indians that lived west of the Missouri, between the Platte and the Niobrara. About 1200 are now on a reservation near the Winnebago.

Omaha, NEB., the largest city of the state and the county-seat of Douglas co., situated on the Missouri River, opposite Council Bluffs, Iowa, 492 mi. w. of Chicago, Ill., on the Union Pacific, the Chicago, Milwaukee & Saint Paul, the Chicago, Rock Island & Pacific, the Chicago & Northwestern, the Illinois Central and other railroads. The Missouri River is here crossed by several great bridges. The city is situated on a plateau above the river. The business center is the lowest portion and the nearest to the river, the bluffs farther inland being used for the residence district. There are several beautiful parks, and wide, well-kept streets. Among the chief buildings in the city are the courthouse, the city hall, the public library, which has about 60,000 volumes, the Federal building, the great coliseum or convention hall, the high school and the Protestant Episcopal and Roman Catholic cathedrals. The educational institutions include the University of Omaha, Creighton University, Bellevue College, Brownell Hall, Academy of the Sacred Heart and several medical colleges. Among the charitable institutions are the state institute for the deaf and dumb and a number of well-equipped hospitals.

Omaha possesses extensive railroad shops and one of the largest silver smelting works in the country, together with manufactures of linseed oil, white lead, machinery, steam engines and malt and distilled liquors. The meat-packing houses, which are surpassed in importance only by those of Chicago and Kansas City, are located in South Omaha (See SOUTH OMAHA).

The first settlement was made at Omaha in 1854, and it was named from the Omaha indians. For thirteen years it was the capital of the state. It became a city three years after its foundation. Its growth has been due largely to its position as one of the most important gateways to the west. In 1898 a Trans-Mississippi and International Exhibition was held in Omaha. Population in 1900, 102,555.

Oman, *o mahn',* a sultanate in the southeastern part of Arabia, partly on the Persian Gulf and partly on the Indian Ocean. Its area is estimated at 80,000 square miles, and its population at 1,000,000. The chief features of the country are the stretches of barren sand and rock; the mountains near the coast, which rise in places to 10,000 feet, and the fertile valleys and plains, which yield an abundance of sugar, coffee, rice, cotton and fruits. Dates constitute the chief product and the largest export. The country is the richest part of the peninsula, both in agricultural products and in mineral resources. The inhabitants are mostly Arabs, but there is a considerable admixture of Hindus, Persians and negroes. The form of government is a monarchy, the ruler being known as the *imam.* The capital is Muscat.

Omar I, *o'mahr,* (581?–644), successor of Abu-bekr, and second caliph of the Mohammedans. He became a follower of Mohammed about 615 and succeeded to the caliphate in 634. His rule is celebrated for the great extension of Mohammedanism. The conquest of Syria was completed by one of his generals; another general was equally successful in Egypt, and when, in 638, Jerusalem was compelled to surrender, Omar hastened thither himself, in order to dictate the terms. Omar's generals likewise invaded Persia and conquered the capital and kingdom. The Mussulmans pursued their conquests far into Africa, but Omar did not live long to enjoy his glory.

Omar Khayyam, *ki yahm',* a Persian poet, astronomer and philosopher, born at Naishapur, in the latter half of the eleventh century. He wrote various scientific works which were of high value in their day, but he is now remembered chiefly for his *Rubaiyat,* a collection of epigrams in verse, which celebrate wine, love and pleasure. These are often exceedingly pessimistic and not always refined, but many of them contain real beauty of sentiment. Edward Fitzgerald translated freely into English verse a portion of the *Rubaiyat*.

O'mens, certain signs or phenomena supposed to portend some impending good or evil fortune. Among the ancient Romans the taking of omens was a public institution of great importance. See AUGURS.

Om'nibus, a four-wheeled enclosed carriage, with a long body, with seats running lengthwise along the sides and containing numerous windows. In some cities omnibuses have seats on top, also. Previous to the construction of street railways, the omnibus was in general use for conveying passengers from one part of a city to another, and it is still found in small cities and towns, where it is used to convey passengers from depots to hotels, and in some large cities, where lines of omnibuses make regular trips between different points.

Omnibus Bill, the name given frequently to single legislative acts which include many slightly related or wholly unrelated measures. In American history it is applied to the compromise measures of 1850, which, though embodied in several bills, were passed in accordance with a single plan. See COMPROMISE OF 1850.

Omsk, *ohmsk,* the capital and chief town of the Russian Government of Akmolinsk, situated in western Siberia, at the junction of the Om with the Irtysh, on the Trans-Siberian railway. It is an important military station, has a military school for Cossacks and several academic institutions. Its trade is considerable. Population in 1900, 53,050.

Onega, *o nye'ga,* a river in the northern part of Russia. It rises in Lake Latcha, flows in a northerly course for about 250 miles and enters the Gulf of Onega. It is navigable for steamers for about 80 miles.

Onega, LAKE, a lake in Russia, near the center of the Government of Olonetz and, after Lake Ladoga, the largest lake in Europe, covering an area of about 3670 square miles. It has numerous creeks, bays and islands and is well supplied with fish. It discharges by the Svir River into Lake Ladoga.

Oneida, *o nī'da,* once an important indian tribe inhabiting central New York. A remnant in Wisconsin is well advanced in civilization. See FIVE NATIONS.

Oneida, N. Y., a city in Madison co., 110 mi. n. w. of Albany and 5 mi. s. e. of Oneida Lake, on the New York Central and the New York, Ontario & Western railroads. The city has a considerable trade in fruit and farm and dairy produce, and contains manufactures of furniture, carts, caskets, pulleys, cigars and various other articles. There are four banks, eight churches, a good high school, a city hospital and an old ladies' home. Two miles south of the city is the Oneida Community, and the village of Oneida Castle is about four miles to the south, on the site of the headquarters of the Oneida indians. Oneida was settled in 1839 and was chartered as a city in 1901. Population in 1905, 8420.

Oneida Lake, a lake in the State of New York which forms the boundary between Onondaga and Oswego counties. Its length is about 16 miles, its width, 4 miles. Its waters unite with the Seneca River to form the Oswego River.

O'neon'ta, N. Y., a village in Otsego co., about 70 mi. s. w. of Albany, on the Susquehanna River and on the Delaware & Hudson and the Ulster & Delaware railroads. It has a state normal school, a public library, a state armory and the Fox Memorial Hospital. There is a considerable trade, and the village contains railroad shops, silk, planing and knitting mills, foundries and cigar factories. It was settled about 1800 and was incorporated in 1848. Population in 1905, 8054.

Onion, *un'yun,* a well-known plant, the bulbous root of which is much used as an article of food. It is a biennial herb, with long, narrow leaves and a swelling, pithy stalk. The peculiar flavor varies much according to the size of the bulb, the small reddish onions having much more pungency than the larger ones. The onion may be grown from the tropics to the coldest regions of the temperate zone. There are at least twenty varieties, Strassburg, Bermuda, Spanish and Portuguese onions being among the most esteemed. In Spain, the onion forms a large portion of the food of the poorer classes.

On'kelos, a Greek translator of the Pentateuch, whose version is so faithful that down to the beginning of the sixteenth century it was chanted in the synagogues alternately with the Hebrew, and to the same notes.

On'omac'ritos, an Athenian soothsayer and poet of the time of Pisistratus and his sons. He was a member of the commission which Pisistratus appointed to arrange the poems of Homer and throw out what was spurious. As an interpreter of oracles, he was one time detected making up answers and was consequently banished from Athens by Hipparchus. According to some accounts, however, he was later reconciled with Hipparchus, and we find him attempting by means of forged oracles to induce Xerxes to invade Greece.

Onondaga, *on′on daw′ga,* (people of the hill), a once important indian tribe who lived about the lake that now bears their name. They were the most peaceable of the Iroquoian confederacy and so were not often at war with the whites. A few are still to be found upon reservations in New York. See FIVE NATIONS, THE.

Onta′rio, formerly *Upper Canada* or *Canada West,* a province of the Dominion of Canada, bounded on the n. by Keewatin and James Bay; on the e. and n. e. by Quebec, a portion of the boundary being formed by the Ottawa River; on the s. by the international boundary line, extending through the Great Lakes, the Saint Lawrence, the Niagara, the Detroit, the Saint Clair and the Rainy rivers, and on the west by Manitoba and the international boundary line. The southeastern corner of the province touches upon New York, and the southwestern portion borders upon Minnesota. Most of the northern boundary between Ontario and Keewatin is formed by the Albany River. The outline of the province is very irregular. Its greatest extent from east to west is about 1000 miles, and from north to south, about 700 miles. The area is 260,862 square miles, of which 40,354 square miles are water. This is exclusive of that portion of the Great Lakes belonging to Canada. The area of the province is a little more than five-sixths of the area of Texas.

SURFACE AND DRAINAGE. In general, Ontario is a low plateau with a rolling or wavy surface. This regularity is broken by a height of land, which extends northwesterly from the Thousand Islands in the Saint Lawrence to the north shores of lakes Huron and Superior, where it forms the bluffs that characterize this region. This height of land nowhere exceeds 1200 feet in altitude. Another height of land, caused by the elevation of the rock over which the cataract of Niagara plunges, extends to the head of Georgian Bay, where it reaches its highest point in the Blue Mountains. It thence extends northwesterly, forming the peninsula between Georgian Bay and Lake Huron and the Manitoulin Islands. The southern part of the province bordering upon Lake Ontario is lowland.

The chief rivers are those forming the boundary lines. In addition to these are the Maganetowan and the Muskoka, flowing into Georgian Bay; the Thames, flowing into Lake Erie, and the Petawawa, flowing into the Ottawa. The province contains a large number of lakes. The most important of these are Rice Lake, north of the central part of Lake Ontario; Lake Simcoe, directly north of Toronto; Muskoka Lake, and Lake Nipissing.

CLIMATE. The southern part of the province bordering upon the Great Lakes has a mild and equable climate. In the severest winter weather the thermometer seldom falls lower than 8° below zero, and in the hottest months it seldom reaches 90° above. The influence of the lakes here prevents sudden or great changes, but in the northern part the extremes are greater. Here the winters are severe, and the summers are short and hot. The annual rainfall varies from 40 to 45 inches. During the winter there is sufficient snow to protect the crops and to facilitate lumbering.

MINERAL RESOURCES. Ontario contains extensive deposits of valuable minerals, but many of them have not been worked. There is no coal in the province, but in the western part of the peninsula between lakes Erie and Huron are oil fields that yield about 30,000,000 gallons a year. Natural gas is also found near Niagara and near Detroit. To the north of Georgian Bay are the Sudbury nickel mines, the largest in the world. The output from these mines varies from eight to nine million pounds a year, and its value exceeds $4,500,000. North of lakes Huron and Superior are extensive deposits of copper and iron. The copper ore is mined in large quantities, but the iron deposits have not yet been worked. Traces of gold and silver are also found in various places; the annual output of the gold mines is about $420,000, while that of silver is considerably less. Building stone and clay suitable for brick and tile are widely distributed through the province.

AGRICULTURE. Agriculture is the chief industry and occupies the attention of by far the greater portion of the inhabitants. The southern part of the province, bordering upon the Great Lakes, has a very fertile soil, and the climate is adapted to the growth of all products of the temperate climate. Forage crops, wheat, oats, barley and peas are extensively grown. Wheat is the most valuable crop among the cereals, but oats lead in acreage and in the number of bushels. In the peninsula are found extensive apple orchards, which produce fruit of an excellent quality. Peaches, pears, plums and small fruits are also grown here in large quantities. The northern part of the province is better suited to the growth of hardier crops, such as potatoes, rye and root crops. Dairying and the raising of live stock are important branches of agricultural industry. Ontario has long been known for its excellent breeds of cattle and sheep, while the number of horses is increasing from year to year.

Other Industries. The large shore line of the Great Lakes in Ontario furnishes opportunity for an extensive fishing industry, and the value of the annual catch is about $2,500,000. Among the manufacturing industries, lumbering and the production of lumber and timber products are by far the most important. Formerly almost the entire province was covered by heavy forests, but about half of the area has now been cleared. The lumbering regions are around the head waters of the Ottawa River and east of Georgian Bay, where an abundance of pine, spruce and fir is still found. The manufacture of flour and grist mill products, pork packing and the manufacture of cheese and butter are also important industries, while cotton and woolen mills and other manufactories are gaining a foothold in the larger cities and towns.

Transportation and Commerce. The frontage of the Great Lakes furnishes ample opportunity for water transportation through the Saint Lawrence to the ocean (See Saint Lawrence River; Welland Canal). The southern part of the province is traversed by the Grand Trunk and Canadian Pacific railways and other lines which cross from Detroit to Buffalo. Each of these roads has cross lines and branches extending to the most important agricultural and commercial centers within its territory. The Canadian Pacific also has a line extending across the northern part of the province and westward to the coast. In all there are about 7000 miles of railway, but a number of the counties in Ontario are still without railway communication.

The commerce is extensive. Lumber, agricultural produce, butter and cheese, nickel and some manufactured goods are exported. The principal imports are manufactured products. The United States and Great Britain have the largest share of the foreign trade.

Government and Religion. The executive department consists of a lieutenant governor, appointed by the governor-general of the Dominion for five years, and an executive council of eight members, each of whom is at the head of a department. The legislature is an assembly of one house of 98 members, chosen by popular vote. The courts consist of a superior court of judicature, with one high court of justice and lower courts, such as that of the King's Bench, common pleas and court of appeal. Local administration is by counties and towns.

The larger proportion of the inhabitants are of English and Scotch descent, and the population is divided between the various Protestant denominations and the Roman Catholics, who number about one-fifth of the inhabitants.

Education. Ontario maintains an excellent system of schools, which are under the immediate control of the minister of education. Uniformity as to course of study, methods of instruction and text-books is maintained throughout the province, and in addition to the elementary schools two normal schools and one normal college are maintained. Toronto University is at the head of the educational system, and all of the high schools, common schools and kindergartens are affiliated with it, as are most of the colleges and secondary schools maintained by the various religious denominations. Among the latter the most important are Knox College, Wycliffe College and Huron College, Saint Michael's College, Victoria University and the Upper Canada College, one of the oldest in the Dominion.

Cities. The chief cities are Toronto, the capital; Ottawa, the capital of the Dominion; London, Hamilton and Kingston, each of which is described under its title.

History. Ontario was first visited by Champlain in 1615. He established friendly relations with the Huron and thus brought on war with the Iroquois, in which the Huron were nearly destroyed. During this turbulent period many Jesuit missionaries traversed the province and established stations. In 1749 a French trading station was built on the site of Toronto. The country remained a French possession until the Treaty of Paris, in 1763, when it came under British control and formed a part of the Province of Quebec. After the close of the Revolutionary War, the two provinces were separated, and Ontario was known as Upper Canada or Canada West, but in 1841 the provinces were reunited and thus remained until the formation of the Dominion of Canada in 1867, when Ontario became an independent province and a member of the federation. Population in 1901, 2,182,947.

Ontario, Lake, the most easterly of the great lakes of North America, lying along the northeast side of the State of New York and forming part of the boundary between the United States and Canada. Its greatest length is 190 miles, its greatest breadth about 55 miles and its area, 7250 square miles. The depth is about 600 feet, and the mean elevation of its surface 247 feet. It receives the waters of Lake Erie by the Niagara River and discharges its waters by the Saint Lawrence into the Atlantic, 1000 miles distant. This lake is connected with Lake Erie by the Welland Canal, with the Erie Canal and the Hudson River by the Oswego Canal, and with the Ottawa River by the Rideau Canal. It is navigable throughout its whole extent and at all seasons. The most important places on its shores are Oswego, in the United States, and Toronto, Hamilton, Kingston and Coburg, in Canada.

On'yx, a variety of agate which has its colors arranged in parallel bands. It is usually of shades of brown, green or red, alternating with white. When the red is a deep, brownish red, and the white pure and transparent, the variety is known as *sardonyx.* Onyx was formerly highly prized for making cameos, the figures being formed of one layer and the background of another, and it is still used to some extent for this purpose. *Mexican onyx* is not a true onyx, but is a translucent limestone, with iron and manganese irregularly scattered through it, producing the beautiful variegated appearance for which this stone is noted. It is found in layers in caves, where it was deposited by water. This stone was used by the Aztecs, who carved it into idols, masks and a variety of other objects. It is very soft and easily worked. See AGATE; CHALCEDONY; PRECIOUS STONES.

Onyx Marble, a very beautiful translucent limestone, colored by iron or manganese. When polished, it presents beautiful banded and clouded effects. It is found in paying quantities in Mexico, also in Arizona, California and Colorado, and is used for ornamental work in interiors, for table tops and for small articles, such as inkstands and paper weights.

Oölite, *ō'o lite,* a variety of limestone composed of globules clustered together, commonly without any visible cement or base. They vary in size from that of small pinheads to that of peas. When the grains are very distinct and well rounded, it is called *roe stone*; when they are large and pea-like, the rock is known as *pisolite,* or *pea stone.* What is known as the Oolite or Oolitic Series of rocks in geology consists of a series of strata comprehending the whole of those peculiar limestones and calcareous sandstones which form the middle and upper divisions of the Jurassic formations. See JURASSIC SYSTEM.

O'pah, a large and beautiful sea fish, a native of the Eastern seas, but found in the Atlantic and Arctic oceans. It is about four and a half feet long and weighs one hundred fifty pounds. Its colors are very rich, the upper part of the back and sides being green, reflecting both purple and gold, passing into yellowish-green below, and the fins, bright vermilion. The flesh is highly esteemed.

O'pal, a precious stone, showing a variety of colors when subjected to the light. It consists of silica and water and is very brittle. The general appearance of the *precious opal* is whitish or milky, and the tints displayed are red, yellow, green, and blue or violet. The most brilliant variety is known as the *fire opal,* but it displays fewer colors. Opals of the finest quality are mined at Dunkirk, in Hungary. They are also found in Queensland and New South Wales, Australia, and in Idaho and Washington, in the United States. See PRECIOUS STONES, *color plate.*

Op'era, a musical drama, that is, a dramatic composition set to music and sung on the stage, accompanied with musical instruments and enriched by the accessories of costumes, scenery and dancing. The component parts of an opera are recitatives, solos, duets, trios, quartettes and choruses, and they are usually preceded by an instrumental overture. The chief classes of opera are the *opera comique,* or *opera bouffe,* distinguished by its light, fanciful or broadly humorous theme and treatment; *grand opera,* or *opera seria,* constructed upon more serious themes, sometimes tragic and sometimes comic, in the latter case distinguished from *opera bouffe* as comedy differs from farce; the *romantic opera,* or *opera drammatica* of the Italians, embracing a mixture of the grave and lively.

Though the Greek dramas were operatic in character, the opera proper is of modern date and of Italian origin and would seem to have developed naturally from the miracle play of the Middle Ages, the first operas dating from the sixteenth century. About the close of this century the poet Rinuccini wrote a drama on the classical story of Daphne, which was set to music by Peri, the most celebrated musician of the age. The orchestra of this first opera consisted of four instruments, namely, a harpsichord, a harp, a viol di gamba and a lute. There was no attempt at airs, and the recitative was merely a kind of measured speech. Monteverde, a Milanese musician, improved the recitative by giving it more flow and expression. In the middle of the seventeenth century, *airs* connected in sentiment and spirit with the dialogue were first introduced. The first regular serious opera was performed at Naples in 1615. The first light opera is said to have been presented at Venice in 1624, where also the first stage for operas was erected in 1637. In 1646 the opera was transplanted to France by Cardinal Mazarin; about the same time it was introduced into Germany, and somewhat later it was taken to England.

At the beginning of the eighteenth century a revival and reform occurred, the German-Frenchman Gluck being its chief exponent, his purpose being to restore to opera the dramatic element which it had long lacked. Then began a separate national development in each of the great countries of Europe. The chief Italian composers include, besides those mentioned, Piccini, Cherubini, Rossini, Bellini, Donizetti and Verdi. Among the French composers are Meyerbeer, Grétry, Auber, Halévy, Gounod, Offenbach and Bizet. Among American composers of operas may be mentioned Reginald de Koven, Herbert, Damrosch and Sousa; and of English composers, Balfe, Macfarren, Sullivan and Thomas. It is the German composers, however, who have raised opera to the highest point of perfection, the list including such names as Handel, Mozart, Beethoven, Weber, Flotow and, finally, Richard Wagner, the most celebrated of modern composers. In his work, the vocal music of the piece is deprived of the prominent place formerly assigned to it and is made subordinate to text, instrumentation and scenic decoration. He preferred the name *musical drama* for his most characteristic works.

The following list contains the names of the best-known operas: *Aïda*, by Verdi; *Barber of Seville*, Rossini; *Bohemian Girl*, Balfe; *Carmen*, Bizet; *Cavalleria Rusticana*, Mascagni; *Don Giovanni*, Mozart; *Faust*, Gounod; *Der Fliegende Holländer*, Wagner; *Fra Diavolo*, Auber; *Der Freischütz*, Weber; *Les Huguenots*, Meyerbeer; *Lohengrin*, Wagner; *Lucia di Lammermoor*, Donizetti; *Magic Flute*, Mozart; *Martha*, Flotow; *Meistersinger von Nürnberg*, Wagner; *Mikado*, Sullivan; *Norma*, Bellini; *Oberon*, Weber; *Pagliacci*, Leoncavallo; *Rienzi*, Wagner; *Ring des Nibelungen*, Wagner; *Robin Hood*, De Koven; *Robert le Diable*, Meyerbeer; *Tannhäuser*, Wagner; *Tristan und Isolde*, Wagner; *Les Troyens*, Berlioz; *Il Trovatore*, Verdi, and *William Tell*, Rossini.

Opera Bouffe, *boof*, a farcical form of opera, in which the characters, subject-matter and music are intended to burlesque the more serious style of opera. When dialogue is interspersed with the music for the purpose of disclosing the plot, *opera bouffe* is known as *musical comedy*, and in this form it has been exceedingly popular in recent years, especially in England and America. The most notable of recent productions are *The Mikado* and *H. M. S. Pinafore* by Gilbert and Sullivan of England, *Rob Roy* and *Robin Hood* by Reginald De Koven, *The Idol's Eye* by Victor Herbert, *King Dodo* and *The Prince of Pilsen* by Pixley and Luders, *The Tenderfoot* by Richard Carle, and *The Sultan of Sulu* by George Ade and Wathall.

Opera Glass, a small, double telescope, used for magnifying objects at a distance. The opera glass has a double-convex lens for its object glass and a concave lens for the eye-piece. The eye-piece is attached to a rack and pinion, by means of which it can be properly focused. See FIELD GLASS; LENS; TELESCOPE.

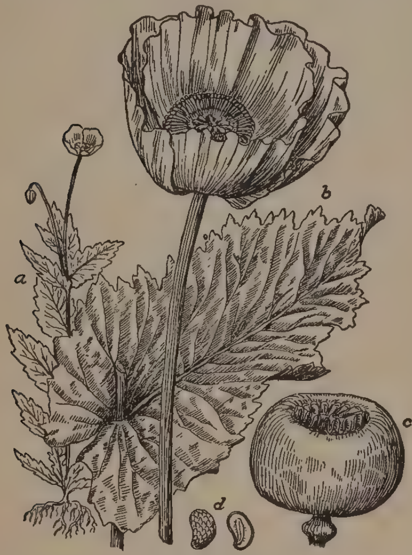
Ophicleide, *of'i klide*, a brass wind instrument, generally consisting of a wide conical tube, terminating in a bell, like that of a horn, with a mouthpiece and ten holes, which are stopped by keys. Ophicleides are of two kinds, the bass and the alto; the former has a compass of three octaves and one note, ranging from B on the third space below the bass staff to C on the third space of the treble staff, including all the intermediate semitones. The alto ophicleide (an inferior instrument) has the same extent of compass, but starts an octave higher.

Ophir, *o'feer*, the region to which the Hebrews made voyages in the time of Solomon, bringing home gold, precious stones and fine wood (*I Kings* IX, 26–28; X, 11; *II Chron.* VIII, 18). Some authorities believe that it was situated in Arabia; others place it in India or Africa.

Ophthalmia, *of thal'me a.* See CONJUNCTIVITIS.

Ophthal'moscope, an instrument for observing the internal structure of the eye. It consists of a mirror, by which light from an artificial source is directed into the eye of the patient, and a double convex lens, by which the illumined parts of the structure of the eye are magnified, in order that they may be more easily examined, the observer looking through a hole in the center of the mirror. The light is usually placed to the side of and slightly behind the patient's head.

O'pium, the dried juice of a species of poppy, cultivated on a large scale, principally in Hindustan and in Asiatic Turkey, but well known in many places as a garden plant, being an annual, with white, red or violet flowers and glaucous leaves. The juice is taken from incisions made in the green heads or seed capsules after the fall or removal of the petals, and the best flows from the first incision. The juice, which is at first a milky liquid, soon solidifies and turns black and is then scraped off and collected. It is one of the most powerful of narcotics, and at the same time it forms one of the most important of medicines. It is employed in a great variety of cases, but it is most commonly for the purpose of procuring sleep and giving relief from pain. In medicine it is very commonly used in the form of *laudanum*, which is a simple tincture or extract in spirits of wine. Opium is also an ingredient in various patent medicines and other remedies (See MORPHINE).

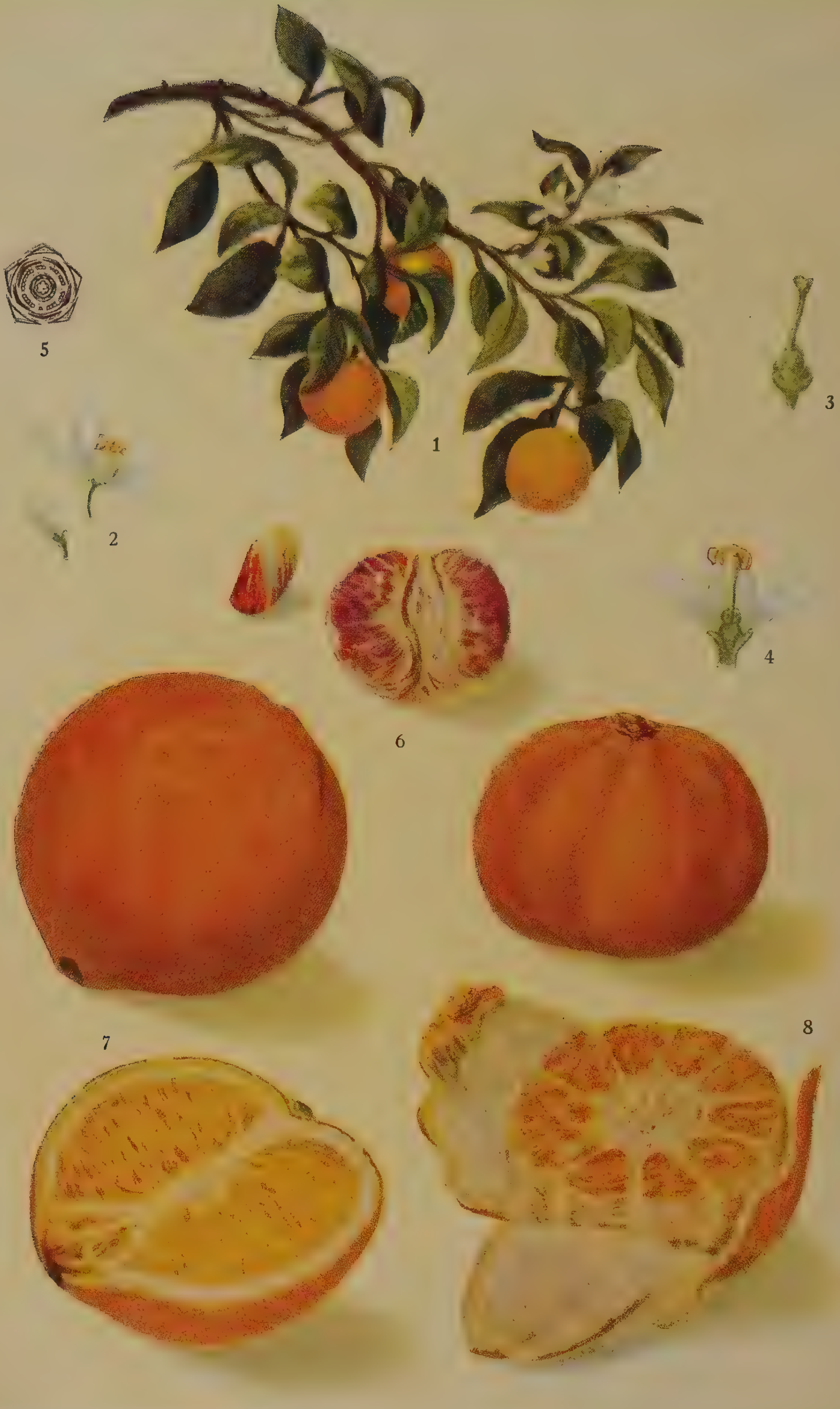


OPIUM POPPY
a, whole plant; *b*, flower and leaf; *c*, ripe capsule; *d*, seed and its section, enlarged.

In its natural state opium is heavy, of a dense texture, of a brownish-yellow color, not perfectly dry, but easily receiving an impression from the finger; it has a faint smell, and its taste is bitter and acrid. The supply of opium is brought principally from Turkey, whence it is imported in flat pieces or cakes, covered with leaves. In the case of many temperaments, opium produces such agreeable effects, whether a delightful dreamy calm, a state of pleasant exhilaration, or beatific visions, that numbers of persons are led to use it habitually, as others use some form of alcoholic drink. Evil effects at least as serious as those of drunkenness follow over-indulgence in opium. Habitual users of the drug can take in a day what would kill ten or twenty persons not used to it. The habitual use of opium is most common in China, the southeast of Asia and the Malay Archipelago, where it is chiefly smoked in a special pipe. The pipe, or rather the stem of the pipe, is about the length and size of an ordinary flute, and the bowl, which is generally made of earthenware, is very small. The smoker, who is always lying down or at least reclining, takes a small portion of opium about the size of a pea on the end of a spoon-headed needle, heats it at a lamp, and then places it in the bowl of the pipe. He then brings the opium to the flame of the lamp, inhales the smoke in several inspirations, and is then ready to repeat the process with a fresh quantity of opium until the desired intoxication ensues.

Opor'to, a city and seaport of Portugal, the second in size in the kingdom, capital of the district of its own name, on a steep declivity on the right bank of the River Douro, 3 mi. from its mouth and about 175 mi. n. n. e. of Lisbon. The river is crossed by two bridges of recent construction, one of which is among the largest and most beautiful bridges of its kind in Europe. Among the chief buildings of the city are the "Tower of the Clergy," a granite structure 246 feet high; the Gothic cathedral, the episcopal palace, the exchange, the crystal palace, the mint and the opera house. There are also museums, a large library, a medical college, schools of commerce and navigation and other schools of high rank, together with hospitals, art galleries and fine gardens. Oporto is the chief industrial city of Portugal. The principal trade is in wine, chiefly port wine, which is named from the town. There are manufactures of hats, silks, cotton, woolen and linen stuffs, paper, wax, tobacco, soap and other articles. Oporto was an important town during the Middle Ages. In 1808 it was captured by the French, and in the following year Wellington drove the French out of it, after the remarkable passage of the Douro. Population in 1900, 167,955.

Opos'sum, a mammal found in America as far north as Hudson Bay. It is somewhat closely related in structure to the marsupialia. Opossums are nocturnal in their habits and live con-



ORANGES

1, Branch with Fruit and Flower.
2, Flower and Bud.
3, Pistil and Ovary.
4, Section through the Flower.
5, Plan of the Flower.
6, Blood Orange.
7, Navel Orange.
8, Tangerine.

stantly in trees, feeding on birds, insects and on almost anything which comes in their way. The females of certain species have, like the kangaroo, an abdominal pouch, in which they can hold their young. The best-known species of opossum is one which is found in the United States. It is about the size of a large cat and is whitish-gray in color, the hair being soft and wool-like. When captured or threatened with danger, the opossum feigns death, and the phrase "playing 'possum" is on this account often used to indicate any deceitful proceeding. The flesh of the opossum is edible and is much sought after by southern negroes.

OPOSSUM

Op'per, Frederick Burr (1857–), an American illustrator, born in Madison, Ohio. For several years he was connected with Frank Leslie's magazines, *Puck* and Hearst's *New York Journal.* He made his reputation by his political cartoons during the presidential campaigns. His drawings are characterized by force and show a keen sense of humor. He has illustrated the works of Bill Nye and Mark Twain, and Peter Dunne's *Mr. Dooley.* He also ranks as an author of some note, having written *Folks in Funnyville, John Bull, Happy Hooligan, Alphonse and Gaston* and *Our Antediluvian Ancestors.*

Optic Nerve. See Eye.

Optics. See Light.

Optimism, *op'ti miz'm,* the philosophical belief or doctrine that a perfect principle underlies, and is manifested in, the seemingly imperfect life of the universe. The final supremacy of good is maintained by this doctrine. "All is for the best" is the motto of the optimist. Socrates and Plato in their systems of philosophy strongly support this view and affirm that Good is the all-wise, eternal governor of the universe. To a greater or less extent, every one believes in optimism, and it may be said to be the foundation of hope. One who habitually looks upon the bright side of life and sees ultimate good in all things is called an *optimist.* See Pessimism.

Or'acles, the answers which the gods of the Greeks, Romans, Egyptians and other ancient peoples were supposed to give, by words uttered or otherwise, to those who consulted them upon any occasion; also, the places where these answers were received. The belief in oracles was so great that vast numbers flocked to them for advice, and scarcely any war was waged, or peace concluded, or new form of government instituted, or new laws enacted, without the approbation of some oracle. The Greek oracles were the most celebrated, and among these the earliest, and one of the most famous, was that of Jupiter at Dodona. Apollo had many oracles, but that at Delphi held the first place, and it was often applied to for explanation of obscure answers obtained at Dodona. Another famous oracle of Apollo was in the island of Delos. The Romans had no important oracles of their own, but often consulted those of Greece and Egypt. The Greek oracles long maintained their standing, and sank only with the freedom and independence of Greece. Under the reign of Theodosius, the temples of the prophetic deities were closed or demolished. See Dodona; Delphi.

Oran, *o rahn',* a seaport of Algeria, capital of the Department of Oran, 260 mi. w. s. w. of Algiers. It is a well-built town, and its aspect is largely French. The harbor was formerly at Mers-el-Kebir, about 3 miles from the town, but within recent years accommodation for shipping has been provided at Oran itself. The new harbor, however, is not as good as the old. The city has a considerable trade, and its chief exports are cereals, wine, olives, brandy, flour, esparto grass and sheep and cattle. Oran was built by the Moors, was captured by the Spaniards in the early sixteenth century, two hundred years later was taken by the Turks and in 1708 was regained by the Spaniards. In 1791 an earthquake practically destroyed the town, and the Spaniards abandoned it. It was taken by the French in 1831. Population in 1901, 87,801.

Orange, *or'enj,* a fruit related to the lemon, lime and citron. The orange is a native of China, India and other Asiatic countries, and was first introduced into Portugal about 1520. It is extensively cultivated in the south of Europe and in Florida and California, also upon the Azores, in northern Africa, in the West Indies and in Australia. The orange tree is small and has broad, green leaves. Under the most favorable circumstances it seldom exceeds thirty feet in height, and in cultivation it is kept much lower. The branches are low, and the flowers are white and wax-like; because of their beauty and fragrance orange blossoms have long been worn in almost all parts of the world by the bride on her wedding day.

The fruit is nearly spherical, bright yellow in color, and contains a pulp which consists of a collection of oblong segments, filled with a sugary and refreshing juice and in most varieties containing several seeds. There are many varieties under cultivation, but those in greatest demand in the United States are the *navels,* which are seedless. This orange was introduced from Brazil and is now grown in large quantities in California. *Blood oranges* are so called from the color of their juice, which is dark red. The oranges grown in Florida are generally known as *russets.* They are of a lighter yellow than the others, and the peel has a bronze coat which gives the orange its name. The *mandarin* orange, introduced from China, is small and somewhat flattened.

When sufficiently ripe, oranges are picked by hand, sorted as to size, wrapped in tissue paper and packed in boxes for the market. The California oranges are usually shipped in refrigerator cars, so that they reach their destination without damage. The orange industry in California and Florida is one of great importance to those localities. California has over 6,000,000 trees, and Florida about half as many. See color plate.

Orange, MASS., a town in Franklin co., 37 mi. n. by e. of Springfield, on Millers River and on the Boston & Maine railroad. It is built on a hill above the river, and contains manufactures of sewing machines, motor carriages, water wheels and other machinery, furniture, shoes and other articles. There are three attractive parks and a public library. The town was incorporated in 1810. Population in 1905, including several villages, 5578.

Orange, N. J., a city in Essex co., 4 mi. n. w. of Newark, on the Delaware, Lackawanna & Western, the Erie and several electric railways. It is situated on the slopes of Watchung Mountain, at an elevation of 150 to 200 feet. It has become a noted residence place and contains many fine homes of Newark and New York City business men. Llewellyn Park, of 750 acres; Hemlock Falls, in wild, picturesque scenery, and Eagle Rock, on the east brow of the mountain, are places of considerable interest. The principal structures are the Stickler Library, Decker and Metropolitan buildings, Music Hall, Memorial Hospital, an orphan home, the House of the Good Shepherd, the Masonic Temple and the old First Presbyterian Church. The city also contains the Seton Hall College, Locke College for boys, a public library and a number of athletic and social clubs. The laboratory of Thomas A. Edison is located near Llewellyn Park. Hat making is the most important industry, and there are also printing plants and other works. The place was settled about 1666, was separated from Newark and incorporated as a town in 1806 and was chartered as a city in 1870. Population in 1905, 26,101.

Orange Free State. See ORANGE RIVER COLONY.

Or'angemen, the members of a secret society founded in the north of Ireland in 1795, to uphold the Protestant religion and political ascendency and to oppose the Catholic Church and affiliated secret societies. The title of the association was adopted in honor of William III of England, prince of Orange, who, in the Battle of the Boyne, July 12, 1690, assured the ascendency of Protestantism in Great Britain and Ireland. In 1835 the society was dissolved, in consequence of intrigues in the army, but it was revived in 1845. Great demonstrations take place annually on July 12.

Orange River or **Gariep,** a river of South Africa, which forms part of the northern boundary of Cape Colony and which falls, after a course of almost 1300 miles, into the Atlantic. Its volume varies greatly, and it is useless for purposes of navigation, owing to the bars, rapids and shallow places.

Orange River Colony, formerly Orange Free State, a colony of Great Britain, in South Africa, s. of the Transvaal Colony, n. of Cape Colony and w. of Natal and Basutoland. Its area is estimated at 50,392 square miles, or about the same as that of Louisiana. Lying at a height of about 4000 feet above the sea, the country, which is composed chiefly of vast undulating plains, is cold in winter, with violent thunder storms and long droughts in summer. The climate is, however, very healthful. Pasturing is the chief occupation, and wool, hides and ostrich feathers are among the principal exports. Agriculture is increasing in importance, and corn is exported in considerable quantities.

Diamonds and other precious stones have been found in paying quantities. Rich coal mines exist, and the country is said to abound in other mineral wealth. There are over 400 miles of railway in operation, the chief line being the one which connects Bloemfontein, the capital of the colony, with the Transvaal railway systems.

The colony is under the authority of the governor of the Transvaal and Orange River colonies, who in the latter colony is represented by a lieutenant governor. Education, while under the control of the government, is neither free nor compulsory. In 1836 a colony of Boers from Cape Colony, dissatisfied with the British rule there, entered the territory which is now the Orange River Colony. The British annexed the territory in 1848, but in 1854 it was declared a free state. When war broke out between the South African Republic and Great Britain, the Orange Free State joined the former, and as a result of British successes was declared a possession of the British crown in 1900. Population in 1904, 387,315, of whom 142,679 were white. See Transvaal Colony.

Orang'-utan' or **Orang-outang**, one of the anthropoid, or manlike, apes, or monkeys. It reaches a height of four or five feet and is second in size only to the gorilla. It is one of those animals which approach most nearly to man, being in this respect only inferior to the chimpanzee and gorilla. It is utterly incapable of walking in a perfectly erect posture. Its body is covered with coarse hair, of a brownish-red color, but the face is destitute of hair, save at the sides. The arms reach to the ankle joint, the hind legs are short and stunted and the nails of the fingers and toes are flattened. The orang-utans swing themselves quickly along from tree to tree, by the aid of their long arms, but their gait on the ground is awkward and unsteady. They are remarkable for strength and intelligence and are capable of being tamed, if captured when young. They feed chiefly on fruits and sleep in trees. The orang-utan seems to be confined to Borneo and Sumatra. See Man; Ape; Monkey.

ORANG-UTAN

Ora'tion, an oral address, for the purpose of persuasion, containing high thoughts and sentiments, expressed in elegant language. Orations may be of several classes: *demonstrative*, in which the purpose of the speaker is less to persuade than to please his audience; *deliberative*, or *exhortative*, in which the speaker aims to secure a certain decision, to arouse people to action or to convince them of a truth; *judiciary*, used chiefly by advocates in court, characterized by clearness, close logic and earnestness. The oration was the form of literature first to be developed to comparative perfection. It advanced through all the stages from the exhortation of armies by their commanders to the addresses in behalf of great causes in modern free deliberative assemblies. Among the Greeks were many famous orators, of whom Isocrates, Demosthenes, Aeschines and Pericles are especially famous. The names of Cicero, Mark Antony and Cato represent Roman oratory at its best. From the downfall of the Roman Empire until the late modern period, oratory suffered a decline, but at the time of the American and French Revolutions there was another awakening, signified by such names as Pitt, Mansfield, Sheridan, Burke, Fox, Patrick Henry, James Otis, Alexander Hamilton and Richard Henry Lee. Probably in no equal period in the history of any nation have so many remarkable orators arisen as during the slavery controversy in the United States: Calhoun, the spokesman of the South; Webster, the representative of the North; Clay, the compromiser and defender of the Union; Sumner, the advocate of universal liberty; Douglas, the expounder of state sovereignty; Everett, one of the greatest scholars and rhetoricians of his time; Choate, unsurpassed as a forensic orator; Phillips, the agitator; James G. Blaine, the political orator; George William Curtis, the supporter of independence and honesty in politics, and last, but by no means least important, Abraham Lincoln, who deserves mention, if for no other reason than that he gave to the world the marvelously concise and inspiring *Gettysburg Address*. See Literature.

Orato'rio, a sacred musical composition, to be performed with full orchestral, and sometimes organ, accompaniment, the subjects being generally taken from Scripture. Its origin has been usually fixed at about the year 1540, its chief object at that time being to render religious services attractive. Its increasing popularity induced poets of eminence to supply texts for these works. Among the most notable oratorios are *The Messiah*, by Handel; *The Creation* and *The Seasons*, by Haydn; *Saint Paul* and *Elijah*, by Mendelssohn, and *Passion According to Saint Matthew*, by Bach.

Or'chardson, William Quiller (1835–), a Scotch painter, born in Edinburgh. In 1863 he removed to London, and he became a full member of the Royal Academy in 1879. He is among the first of British incident painters and was a fine colorist; most of his works are dramatic and picturesque. Among his more notable pictures are *The Challenge, Christopher Sly, The Queen of the Swords* and *Napoleon on Board the Bellerophon.*

Orchestra, *or'kes tra,* the space in theaters between the spectators and the stage, appropriated by the Greeks to the chorus and musicians, by the Romans reserved for the senators, and in modern theaters occupied by the musicians. The name is also applied to the part of concert rooms assigned to the vocal and instrumental performers; to the instrumental performers, collectively taken, and to the whole body of instruments upon which the latter play. A modern orchestra, in the last sense, consists of stringed, wind and percussion instruments, in varied proportions, according to the number of performers. This number varies from eight to more than a hundred, with as many as twenty different instruments represented.

Orchids, *or'kidz,* the common name of a family of curious plants, found plentifully in the tropics, but also represented by many species in the temperate regions. There are, in all, several thousand species, some growing naturally in the ground; others upon tree trunks or rocks, seeming to obtain all their nourishment from the air, and a third class growing as parasites upon trees and other plants. Orchids are favorites with gardeners and plant lovers, because of the extraordinary forms of the flowers, the brilliancy of their colors and their pleasing fragrance. There are probably 3000 species now under cultivation, and there are many elegant private and public collections. Single rare specimens have commanded enormous prices, and wealthy people have sent hunters into all parts of the world where orchids abound, in the search for new and rare species. So far, Mexico, Central America and South America have been the most productive of fine specimens.

The flowers are of extremely irregular shape and are either solitary or grouped in spikes or in long, loose clusters. Normally the flowers have three petals, one of which, called the *lip* or *labellum*, is developed in a remarkable manner. In some species this is a long, narrow strip; in others, a broad surface variously cut and fringed, and in still others, a pouch or sack, as in the common lady's slipper. The purpose of all, however, seems to be to force insects to assist or insure the fertilization of the flower, for in most species it is quite impossible for them to fertilize themselves, and most of them would soon become extinct, were it not for the aid of the insects. Besides the lip, another remarkable organ in the plant in blossom is a spur, in the bottom of which is secreted a honey that attracts insects. In endeavoring to obtain this honey, the insect collects the pollen, which usually grows in sticky masses of definite shape. By the time the insect is ready to visit the next flower, this mass has taken such a position that it is thrust against the pistil. The devices by which insects are attracted, forced to brush against the pollen and later compelled to rub the pollen against the stigma, furnish a never-ending source of wonder. In the lady's slipper, for instance, the insect is tempted to enter the sack, which it may do from any side, but when it tries to leave, the curled edge of the petal and the stiff, slanting hairs prevent it from going out except by the very narrow path which leads by the pollen mass and the pistil. But this is not all. Each species of orchid must be fertilized by an insect which is especially adapted in size and shape to carry the pollen. In fact, nothing in the vegetable kingdom is more wonderful than the strange and characteristic shapes into which the flowers have grown, to adapt themselves to their insect friends (See Flowers, *color plate*, Figs. 1, 2, 3, 4, 5 and 6). The lady's slipper, the begonia, the calopogon and several fringed orchids are beautiful specimens found in damp soils in the United States. In the tropics there are many species of air plants which have exceedingly peculiar and unprepossessing foliage, but which bear marvelously brilliant and beautiful flowers.

Ord, Edward Otho Cresap (1818–1883), an American soldier, born at Cumberland, Md. He graduated at West Point, entered the army and as second lieutenant took part in the Seminole War (1839–1842). He performed garrison service during the Mexican War, and later took part in several indian campaigns and in the capture of John Brown at Harper's Ferry. He became brigadier general of volunteers in 1861, was promoted to be major general and took part in several western campaigns. After a forced retirement, on account of wounds, in 1864, he joined Grant's army in Virginia and was of the greatest service in preventing Lee's escape from Richmond. He was made brigadier general in the regular army, retired in 1880 and by special act of Congress was made major general in 1881.

Ordeal, *or'de al*, an ancient form of trial, to determine guilt or innocence. There were two principal kinds of ordeal, *fire ordeal* and *water ordeal*; the former was confined to persons of high rank, the latter, to the common people. Fire ordeal was performed either by taking in the hand a piece of red-hot iron or by walking barefoot and blindfold over glowing coals or over nine red-hot plowshares, laid lengthwise at unequal distances. If the person escaped unhurt, he was adjudged innocent, otherwise he was condemned as guilty. Water ordeal was performed either by plunging the bare arm to the elbow in boiling water, or by casting the person suspected into a river or pond. If, in the first case, he escaped uninjured, or if, in the second, he sank, he was acquitted. As success or failure, except in a few cases, depended on those who made the requisite preparations, a wide field was opened to deceit and malice. The Chinese still retain the ordeal of fire and water, and various ordeals are practiced among the Hindus and some African tribes.

Orders, Religious. See Monachism; Benedictines; Dominicans; Franciscans.

Or'dinance of 1787, a statute adopted by Congress, July 13, 1787, providing a plan of government for the territory northwest of the Ohio River, known as Northwest Territory. The government was placed temporarily in the hands of a governor, a secretary and three judges, who might apply to the territory any law then in force in any of the thirteen states. The legislature was to be organized as soon as there were five thousand free males of "full age" in the district. The ordinance also included six other articles, which constituted its distinctive feature. They granted religious freedom, guaranteed the benefit of the writ of *habeas corpus*, trial by jury and proportionate representation in the legislature, emphasized the necessity for education, forbade slavery and declared that the territory should always remain a part of the United States. The ordinance has been called the "greatest and most important legislative act in American history." See Northwest Territory.

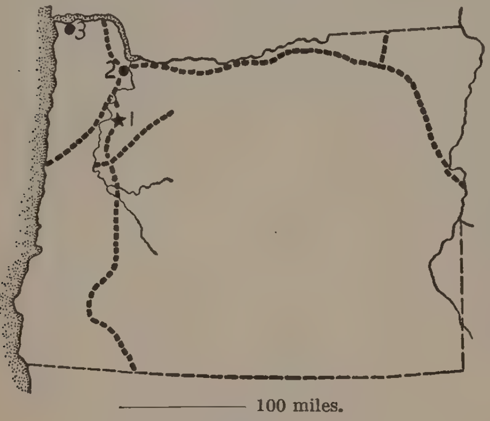
Ord'nance. See Cannon; Artillery.

Ordovician, *or do vish'an*, **System,** a system of rocks, including the formations between the Cambrian system, below, and the Upper Silurian or Silurian Proper, above. In the older classification this system is called the *Lower Silurian*, and that name is still generally used in the United States. In North America the rocks are especially prominent in New York, where local names have been given a number of the formations, such as the Niagara, the Hudson, the Trenton and the Chazy. Ordovician rocks also occur westward from the Appalachians as far as Minnesota. In general, they follow the V-shaped Laurentian continent of that period. Most of the rocks are marbles and sandstones, and some of them are of considerable economic value. The petroleum in Indiana and Ohio and some of the natural gas found in these regions occur in the Ordovician formations, as do the deposits of zinc and lead ore found in Wisconsin, Illinois and Missouri. See Cambrian System; Silurian System; Paleozoic Era.

Ore, a mineral from which metals can be extracted with profit; in its broadest sense, any mineral which contains a metal in combination with some other substance, such as oxygen, silver or carbon. Metals found free from such combination and exhibiting their natural character are called *native*. Metals are commonly obtained by the crushing of the ore and smelting, either in a blast furnace or an electric furnace. Often the ore is first roasted, then smelted and subjected to chemical processes, as in the case of the extraction of gold and silver from low grade ores.

Or'egon, the Beaver State, one of the Pacific states, bounded on the n. by Washington, on the e. by Idaho, on the s. by Nevada and California and on the w. by the Pacific Ocean. Its length from e. to w. is 395 miles, and its average width from n. to s. is 278 miles. The area is 96,030 square miles, of which 1470 square miles are water. Population in 1900, 413,536.

Surface and Drainage. The Cascade Mountains extend across the state from north to south and divide it into two unequal areas, about two-thirds of the state being east of the mountains. This eastern portion is a high plateau, with an uneven, rolling surface in the south and low mountains in the north, merging into the region of the Blue Mountains in the northeast. West of the Cascades and running inland from 10 to 50 miles is the Coast Range, which extends parallel with the coast. Between these ranges is a broad and fertile valley, traversed by the Willamette and the Umpqua rivers. The Cascades, which are a prolongation of the Sierra Nevadas, have an average altitude of about 7000 feet, with numerous peaks rising to between 11,000 and 12,000 feet. Prominent among these are Mount Hood, Mount McLoughlin and Mount Jefferson. The Cascades send off numerous spurs, which run in a northwesterly and northeasterly direction and give the valley between them and the Coast Range a widely diversified appearance. The Coast Range has an average altitude of about 4000 feet and contains few peaks of note. These mountains, as well as the spurs and western slope of the Cascades, are heavily timbered up to the tree line, and here is found one of the most dense and valuable forests in North America.



OREGON
1, Salem; 2, Portland; 3, Astoria.
Dotted lines indicate chief railroads.

The Columbia River, which forms most of the northern boundary, and its largest tributary, the Snake, forming the greater part of the eastern boundary, drain the northern half of the state. The chief tributaries of the Columbia from west eastward are the Willamette, the Deschutes and the John Day. The southeastern part of the state is drained by the Owyhee, which rises in Nevada and flows northward into the Snake. West of the Cascades and south of the Willamette are found the Umpqua and the Illinois, flowing directly into the Pacific. In the southern part of the state are a number of large lakes, some of which extend across the border into California. This region, however, is so far removed from railway lines that it is not generally visited and is but little known, except to those who dwell there.

Climate. Like other Pacific states, Oregon has an east and west, rather than a north and south, climate. Owing to the warm winds of the Pacific, that portion of the state west of the Cascades has a mild and equable climate; in winter the average temperature is 42°, and in summer, about 63°. But east of the Cascades, greater extremes are found. Here the thermometer falls as low as 30° below zero in the severest weather and rises to 110°, or more, in the summer months. The rainfall is more uneven than the temperature. Along the coast it varies from 89 to 114 inches, and in the Willamette valley it is about 51 inches, while east of the Cascades it varies from about 13 inches, in the northern part of the state, to $6\frac{1}{2}$, in the southern; hence, the eastern two-thirds of Oregon has an arid climate, and in most of this region irrigation is necessary for the growing of crops. The reason for this unequal distribution of rain is the position of the Cascades and the prevailing westward winds, the mountain ranges extracting from these winds all their moisture before they pass to the eastern part of the state.

Mineral Resources. The state contains large deposits of minerals of great variety. In the Blue Mountains are found some of the most valuable gold mines in the country, and their annual output is about $1,700,000. Silver is also quite extensively mined in this region, and in the southwestern part of the state are found deposits of iron, copper and nickel, while limestone, sandstone and other valuable building material are widely distributed. Bituminous coal and lignite are also found in a number of localities, but the mines have not been extensively worked.

Fisheries. The fisheries of Oregon give employment to over 5000 people and yield an annual income of about $3,000,000. The fisheries are confined almost entirely to the salmon fisheries of the Columbia River. The chief center of catching and canning of salmon is Astoria, but Portland and other towns along the Columbia valley are sometimes engaged in the industry. Sturgeon, halibut, oysters and other fish are taken off the coast in paying quantities.

Agriculture. With scarcely an exception, the soil is of an unusual degree of fertility, and wherever water can be obtained abundant crops are raised. Owing to the varying climatic conditions, as to temperature and moisture, there is a great variety of agricultural industries. The valley between the Cascades and the Coast Range is the portion of the state most densely populated, and here nearly all of the cleared land is occupied by farms. Large quantities of fruit are raised, and dairying, the raising of live stock and the production of standard grains are important occupations. Wheat, oats, rye, barley and corn, together with potatoes and other vegetables, are generally raised. Irrigation is practiced to some extent in the eastern part of the state, but this region is more generally devoted to grazing, and large numbers of cattle and sheep are raised. Along the valley of the Columbia, east of the mountains, crops cannot generally be grown without irrigation.

Manufactures. The extensive forest regions, containing large quantities of merchantable timber, have made lumbering the chief manufacturing industry of the state. The annual output exceeds $12,500,000. The centers of the industry are in the basin of the Columbia River, the largest mills being located at Portland and Astoria. Other important manufacturing industries are flouring and grist milling, slaughtering and meat packing, the manufacture of woolen goods, car construction and repairs and shipbuilding.

Transportation and Commerce. The northern and western parts of the state are fairly well supplied with railway facilities, the Northern Pacific extending along the Columbia River for its entire length, and the Southern Pacific having a trunk line extending from Portland southward into California. Another line enters the state at about the middle point of the eastern boundary and extends northwesterly to the Columbia River. These lines contain a number of spurs and cross lines, so that these portions of the state are well cared for, but the greater part of the region east of the Cascades is entirely without railway communication. The total railway mileage in 1904 was 1737. The Columbia is navigable for ocean vessels as far as Portland and for lighter vessels to the Dalles, and the Snake is navigable for its entire distance along the state. The broad estuary of the Columbia affords an excellent harbor, and landlocked harbors are also found at Tillamook and one or two other places.

The commerce of the state consists of the exportation of fish, fruit, live stock and lumber and the importation of manufactured articles and food products. A fairly extensive foreign commerce is carried on through Portland.

Government. The legislature consists of a senate, which cannot exceed 30 members, and a house of representatives, which cannot exceed 60 members. The senators are elected for four years, and the representatives for two. The legislature meets biennially. The executive consists of a governor, a secretary of state, a treasurer, a state printer and a superintendent of public instruction, each elected for four years. The governor cannot succeed himself. The courts consist of a supreme court of five judges, five circuit courts, each presided over by a judge of the supreme court, and county courts presided over by judges elected for four years, who also have probate jurisdiction.

Education. The state maintains a good system of public schools and has a rapidly increasing fund from the sale of public lands, a liberal grant of which was made to the state by the national government. Another special grant was made for the purpose of supporting the state university. In some sparsely settled regions the inhabitants still suffer from the disadvantages of small schools. The state university at Eugene is at the head of the school system. State normal schools are maintained at Monmouth, Drain, Ashland, Weston and Gold Beach, and the state agricultural college is at Corvallis. There are within the state a number of important colleges and secondary schools, maintained by religious denominations. Among these are the Salem University at Salem, McMinville College at McMinville, Portland University at Portland, Pacific College at Newberg, and Blue Mountain University at Lagrande.

Institutions. The charitable and penal institutions are located at Salem and consist of schools for the deaf and the blind, a hospital for the insane, a boys' reform school and the state penitentiary.

Cities. The chief cities are Salem, the capital; Portland, and Astoria, each of which is described under its title.

History. Drake discovered the coast of Oregon in 1579, and two centuries later, in 1778, Captain Cook visited Nootka Sound. In 1792 Vancouver surveyed the entire coast and ascended the Columbia River. Spain claimed the region by exploration dating as far back as 1603, and the United States claimed it by reason of Robert

Gray's voyage of 1788–1789, when he also discovered and named the Columbia River. Astoria was established in 1811 by John Jacob Astor; two years later it was captured by the British, but was restored to the United States in 1818 by a convention establishing a system of joint control. By a treaty in 1828 this arrangement was continued, neither party forfeiting its claim. Americans were clamoring for "fifty-four forty or fight"; the British demanded the region as far south as the Columbia River. The boundary was finally fixed at 49°, by a treaty in 1846. In 1832, settlement by New Englanders began, and in 1848 Oregon became a territory. Eleven years later admission into the Union was granted, with a constitution which forbade slavery but prohibited negroes from entering or living in the state and fixed the boundaries at their present position. Oregon has always enjoyed peaceful and continuous prosperity, with the exception of the periods of several indian outbreaks and political controversies. Consult Barrows's *Oregon*, in the American Commonwealths Series.

Oregon, The, a famous vessel of the American navy, built in 1891. It gained especial fame for its voyage from San Francisco to Key West during the Spanish-American War in 1898; it traversed sixteen thousand miles between March 14 and May 24, without a single important mishap. Upon arrival at Key West, the vessel was fitted for service in a short time, and in the battle off Santiago on July 3 it took a conspicuous part, under the command of Captain Clark. The *Oregon* has a tonnage of 10,524, is capable of reaching a speed of seventeen knots per hour and is equipped with four 13-inch breech-loading rifles, eight 8-inch breech-loading rifles and four 6-inch rapid-fire guns, in its primary battery, and thirty lighter miscellaneous guns in its secondary battery. Its total cost was about $3,250,000.

Oregon, University of, a state university established by act of legislature in 1872 and opened at Eugene in 1876. It comprises a college of literature, science and arts, a college of science and engineering and a school of music, a graduate school, a school of law and a school of medicine; also, a university academy. The schools of law and medicine are located at Portland. The institution is co-educational, and about thirty per cent of the students enrolled are women. The faculty numbers over seventy, and there are about 500 students. The library contains about 16,000 volumes, and the annual income, which is from state appropriations, is about $60,000. Tuition is free to residents of the state.

Oregon City, Ore., the county-seat of Clackamas co., 15 mi. s. e. of Portland, on the Southern Pacific railroad and on the Willamette River at the head of deep water navigation. There are falls in the river 40 feet high, which are being utilized in the development of electrical power for lighting and manufacturing. The various products include flour, lumber, woolen goods, soap, paper, pulp and other articles. By means of a canal boats go up beyond the falls, and there is electric railway connection with Portland. The city has the House of the Good Shepherd, a public library and good public and parish schools. Population in 1900, 3494.

Oregon River. See Columbia River.

Orel, *ohr yohl'*, a city situated on the Oka River, Russia, 168 mi. n. w. of Veronezh. The city has communication by river and canal with the Baltic, Black and Caspian seas and is an important center of grain trade. It also has a number of manufacturing establishments. Population in 1900, about 70,000.

O'Rell', Max (1848–1903), the pen name of a French writer, Paul Blouet. He served during the Franco-German War as a war correspondent, was newspaper correspondent in England and afterward taught school for a time. Later he made a trip to the United States, and he wrote of this journey and his other travels in a series of books, among which are *John Bull and His Island*, *Jonathan and His Continent* and *English Pharisees and French Crocodiles*. His style is bright, humorous and sarcastic, and his pictures are often truthful, although there is no great depth in his judgments.

Orenburg, *or en boorg'*, a city of European Russia, situated on the west bank of the Ural River, important because of its trade with central Asia. The manufactures include soap and tallow. There are also large abattoirs, and considerable meat and other animal products are exported. Population, about 73,000.

Orestes, *o res'teez*, in Greek mythology, the son of Agamemnon and Clytemnestra. When Agamemnon was killed by Clytemnestra and her lover, Orestes was saved by his sister Electra and sent to the court of his uncle, where he was brought up. On becoming a young man he returned to Mycenae and avenged his father's death by killing both his mother and her lover. For this crime he was relentlessly pursued by the Furies, who drove him in madness from land to land. At last he was informed by the oracle at Delphi that he would be forgiven if he brought back from Tauris to Greece a statue of Diana. When he arrived in Tauris, he found, as priestess in the temple of Diana there, his sister Iphigenia, and together they returned to their home. See AGAMEMNON; IPHIGENIA.

Or'gan (Greek, *organon,* an instrument), the grandest of musical instruments. The three essentials of an organ are (1) a chest of compressed air; (2) a set of pipes, producing musical sounds, in communication with this chest; (3) a keyboard, by means of which this communication may be opened or closed at pleasure. The air is forced into the wind chest by means of bellows, which are operated by water power, by electricity or by hand. To the upper part of each wind chest is attached a *sound board,* a contrivance for conveying the wind to any particular pipe or pipes at pleasure, and divided into as many grooves as there are keys. Air is admitted into these grooves by means of valves, or pallets, which are connected with the keys; the transmission of air, and consequently the quality of the tone produced, is regulated by the *register,* or *slide.* The series of pipes above each slide is called a stop. The principal stops of an organ are the *open, stopped* and *double diapasons*; the *principal, dulciana, melodia, salicional, flute, trumpet, clarion, bassoon, oboe* and *vox humana.*

An organ may have several wind chests, filled by the same bellows, and several keyboards, each keyboard and wind chest representing a distinct organ and connected with a separate group of pipes. In the largest instruments these organs are five in number, namely, the *great organ,* the *choir organ,* the *swell organ,* the *solo organ* and the *pedal organ.* The keyboards for the hand are termed *manuals,* that for the feet, the *pedal.* The most common compass of the manuals is from CC to F, four octaves and a half; that of the pedal from CCC to E or F, two and a quarter to two and a half octaves. There are two kinds of organ pipes—*flute* pipes, or *mouth* pipes, and *reed* pipes, of each of which there are several species, the character and quality of their sound depending mainly on the material employed in their manufacture (wood or metal), their shape and their dimensions.

In 1863 a contrivance was patented for transferring some of the work from mechanism to electro-mechanism. An organ built on this principle is termed an *electric organ.* The principal advantages are that it facilitates the playing and enables the organist to sit at a keyboard at a distance from the instrument. Among the largest organs are those in Saint Peter's in Rome; in the Seville Cathedral; in Haarlem; in Notre Dame, Paris; in the Auditorium, Chicago, and in the Convention Hall, Kansas City. The last-named has 10,000 pipes and 140 stops.

The instrument known as *harmonium, melodeon* or *reed organ,* is only an organ whose pipes are all reeds and whose bellows are operated by the feet of the performer. There is no pedal keyboard. The pipe organ is probably the offspring of the water organ of the Greeks, and from the fourth century A. D. it has been steadily developed and improved. At first the pipes were played by means of slides withdrawn to admit the air; then levers, similar to those used on railroad switches, were used, and from these came the modern keyboard, though it took many years to produce one that could be manipulated easily.

Orgies, *or'jiz,* in ancient times, the mystic rites and wild revels performed in honor of Bacchus; also, the festivals and mysteries of other pagan deities. See BACCHUS; MYSTERIES.

O'riel Window, a window projecting from a building and having three sides, which are generally divided by mullions. It is a picturesque feature of the domestic architecture of the Middle Ages in France and England. It is distinguished from the bay window which rests on the ground, by being supported on corbels and projecting from an upper story.

Oriflamme, *or'i flam,* until Charles VII's reign, the royal standard of France, originally the banner of the abbey of Saint Denis and its lord protector. When the French kings chose Saint Denis as their patron saint, they made the oriflamme the principal banner of their armies. It was a piece of red taffeta, fixed on a golden spear, in the form of a banner, and cut into three points, each of which was adorned with a tassel of green silk.

Or'igen or **Origine** (185–254 A. D.), surnamed *Adamentius,* one of the greatest and most influential of the Greek fathers of the Church, born at Alexandria. His father suffered martyrdom at Alexandria in 202, under the emperor Severus, and Origen undertook the support of his mother and six children. His studies were pursued with extraordinary zeal, while he lived an ascetic life. He left Alexandria during the persecution of Caracalla, visited Jerusalem and Caesarea and preached some eloquent sermons that called forth a rebuke from Demetrius of Alexandria and a call to return home. These persecutions never ceased until the death of Demetrius in 231. In a new persecution, under the emperor Decius, Origen, who was viewed as a pillar of the Church, was thrown into prison, and subjected to the most cruel sufferings, which ultimately resulted in his death. He has been reproached with having attempted to blend the Christian doctrines with the notions of Plato, and, without reason, of favoring materialism. He is credited with some six thousand works, including smaller tracts, but only a few have been transmitted to us, and some of these only in a distorted form. His work against Celsus is considered as the most complete and convincing defense of Christianity of which antiquity can boast. One of his works was the *Hexapla*, but of it we have only fragments. A translation of his extant works into English has been published.

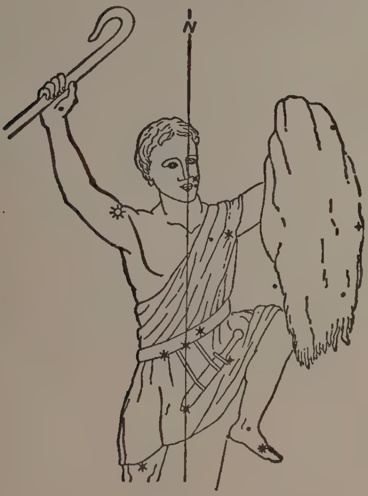
Original, *o rij'i nal,* **Pack'age,** in interstate commerce, the package or covering in which goods are shipped. The term has acquired special significance through a series of decisions of the United States Supreme Court, regarding the power of a state to legislate about the sale of articles of interstate commerce. While a state can regulate commerce within itself, the United States Constitution gives to congress the power to regulate commerce between states. Hence a "Prohibition" state can prohibit the sale or manufacture of liquors in the state, but according to the Supreme Court, imported liquors cannot be regulated by the state, until they become a part of the general mass of its property. And furthermore, goods remaining in the original packages in which they are shipped and while in the hands of the importers, are not part of the general property of the receiving state and hence are not within its jurisdiction. According to these decisions, it was easy to sell liquors in the original packages directly to the consumers and thus to avoid state laws. This possibility was extended by liberal interpretation of the term "original package." In 1890 a law was passed by which all liquors become subject to the police powers of a state as soon as they arrive within its boundaries. This limited greatly the application of the "original package" decisions and simplified the enforcement of liquor laws.

Orino'co, a river of South America, one of the three great rivers of that continent. It rises in the Sierra Parima, on the frontiers of Brazil, flows first west, then north, then east through Venezuela and falls into the Atlantic by numerous mouths. Its length is about 1600 miles. The Orinoco is connected with the Negro River by the Cassiquiare, a natural canal joining the two rivers, and it receives the waters of many considerable tributaries. During the rainy season it floods the vast fields through which it flows. The scenery on its banks is magnificent. Two remarkable rapids, the Maypures and the Atures, occur in the upper part of the Orinoco, but from these the river is navigable to its mouth, about 800 miles.

O'riole, a small, handsome bird of southern Europe, India and Australia. Orioles frequent gardens and groves, avoiding the ground and flying from tree to tree. The *golden oriole* is of a bright golden color, except its wings and part of its tail, which are a rich black. It builds a cup-shaped nest, which it makes firm and warm by lining with wool. In America the name oriole is given to a different bird. See BALTIMORE ORIOLE.

Ori'on, a hero of Greek mythology, about whom various myths are told. The most common of these tells how, for his attempt to carry off Merope, whom he loved, he was blinded by her father, the king of Chios, and sent to wander about the world helpless. Vulcan, however, took pity on him and gave him one of his servants as a guide to conduct him to the sun god, by whom he was restored to sight. Diana, coming upon him while hunting in the forest, fell in love with him, but her brother, Apollo, became very angry at her love for a mortal and often warned her against continuing her favors toward Orion. One day Apollo taunted Diana about her skill with the bow and arrow, and declared that she was not able to strike a certain dark object on the surface of the ocean, which he pointed out to her. Diana shot and struck the object, totally unaware that it was the head of her favorite, Orion, who was bathing in the sea. Inconsolable for his death, she placed him with his dog in the sky, as the constellation which still bears his name. See ORION.

Orion, the most brilliant constellation in the northern sky, seen best in the northeast in winter evenings. By the ancients this constellation was represented by the figure of a man with a sword at his side. The belt is formed by three stars of the second magnitude, and below them are three other stars, in the midst of which occurs a hazy spot. This is not a star, but the great nebula in Orion, which through the telescope is a magnificent object. The red star which marks the right shoulder of Orion is Betelguese, and the blue star at his left foot is Rigel. Both are of first magnitude. Between them and above are the three stars that mark the head.



ORION

Oris'kany, Battle of, a battle fought about two miles west of Oriskany, N. Y., August 6, 1777, between a force of eight hundred Americans, under General Nicholas Herkimer, and about an equal force of Tories and indians, under Sir John Johnson and the indian chief, Joseph Brant. The American force was on its way to assist the garrison of Fort Schuyler, but was ambushed in a deep ravine and compelled to fight a long and bloody hand to hand battle, which resulted in an American success. The battle was influential in deciding Saint Leger to retreat toward Canada. General Herkimer was mortally wounded in the engagement.

Orizaba, *o re thah'ba,* a town of Mexico, in the State of Vera Cruz, 70 mi. w. s. w. of Vera Cruz, on the railway which connects the latter city with Mexico. It lies in a fertile valley, about 4090 feet above sea level, and is a rapidly improving trade center. Tobacco grown in the neighborhood is extensively manufactured, and there are manufactures of leather and cotton and woolen cloths. In its vicinity is the extinct volcano of Orizaba, or Citlaltepetl. Population in 1900, 32,894.

Ork'ney Islands, a group of islands off the north coast of Scotland, from which they are separated by a channel called the Pentland Firth. The area of the islands is about 375 square miles. There are 67 islands and islets, about 30 of which are inhabited. Pomona, or Mainland, is the largest of the group, and others of the more important are South Ronaldshay, Hoy, Westray, Flotta, Graemsay and Shapinshay. Excepting Hoy, none of the islands has hills of any great height. There are no large streams, but many lakes and springs. The air is moist, but the climate is remarkably mild in winter. Agriculture is not in a very flourishing condition, but oats, barley, potatoes and turnips are raised. Pasturing and fishing are the other chief supports of the inhabitants, the manufactures being limited to hosiery, chiefly hand made. The chief town is Kirkwall, the capital.

It is probable that the Picts originally possessed the Orkney Islands, but in the eighth century, and subsequently, they were occupied by the Northmen. In the ninth century Harold Haarfagr attached them to Norway, and for several centuries they were ruled by jarls, who sometimes owed allegiance to Norway, sometimes to Scotland. About the middle of the thirteenth century they were transferred to Alexander, king of Scotland, but the Norwegians continued to assert their sovereignty. James III of Scotland received the islands as a dowry with Margaret of Norway in 1468, and from that time they have belonged to Scotland. They constitute a Scottish county. Population in 1901, 26,698.

Orleans, *or la ahN',* a city of France, formerly capital of Orléanais, now capital of the Department of Loiret, is on the right bank of the Loire, 75 mi. s. s. w. of Paris. It has some handsome public squares, a magnificent late-Gothic cathedral from the seventeenth century, two Hotels de Ville, a Palais de Justice and other notable buildings. The house where Joan of Arc lodged is still standing, and it contains an interesting museum of her relics. A bronze statue of the Maid of Orleans is one of the finest sculptural works of the town. The manufactures and trade of the place have declined greatly, but confectionery, pottery and woolen goods are still manufactured. Orléans was built on the site of an ancient Gallic town which was destroyed by Caesar. It was a place of importance under the Merovingian kings and under the early kings of France. In 1428 the city sustained a siege against the English and was relieved by the Maid of Orleans (See Joan of Arc). It was taken and retaken more than once in 1870 during the Franco-German War. Population in 1901, 67,311

Orleans, a French royal family, two houses of which have occupied the throne of France. On the death of Charles VIII without issue, in 1498, Louis, duke of Orleans, great grandson of their common ancestor Charles V, and grandson of the first duke of Orleans, ascended the throne under the title of Louis XII. Henry III, who died in 1589, was the last sovereign of this house, or the Valois-Orleans branch. For the House of Bourbon-Orleans, see BOURBON.

Orleans, LOUIS PHILIPPE JOSEPH, Duke of (1747–1793), better known as Egalité. His opposition to the court began in 1771, and he became the rallying point of its enemies. In 1787 he was exiled for the part he took in the Assembly of Notables; in 1789 he was one of the nobles who joined the Third Estate, and in 1792 he went over to the revolutionary party without reserve, took the name of *Philippe Egalité* (Philip Equality) and voted for the death of Louis XVI. It did not save him from being arrested as a Bourbon, condemned and beheaded.

Orleans, MAID OF. See JOAN OF ARC.

Orleans, PHILIPPE, Duke of (1640–1701), only brother of Louis XIV of France, and founder of the House of Orléans, which for a short time held the throne of France. In his twenty-first year he married Henrietta Maria of England, sister of Charles II. The great esteem which the king showed for this princess excited the jealousy of his brother, and her sudden death was attributed to poison, to the administration of which the duke was suspected of being accessory. The second marriage of the duke, with Elizabeth of the Palatinate, was arranged by Louis to secure the neutrality of the elector Palatine in the approaching war against Holland. In this war the duke distinguished himself, in spite of his effeminacy.

Orleans, PHILIPPE, Duke of (1674–1723), regent of France during the minority of Louis XV. He early came under the influence of the clever and unscrupulous Dubois, who continued his confidant and adviser through life. In 1692 he married Mademoiselle de Blois, the legitimated daughter of Louis XIV. In 1707he was appointed to succeed the duke of Berwick in Spain, and completed the subjugation of that country, but he was recalled because he was suspected of intriguing for the crown of Spain. On the death of Louis XIV in 1715 he was appointed regent. On acceding to power he found the finances in extreme disorder and endeavored to improve matters by retrenchment and peace; but his reckless introduction of a vast paper currency brought the nation to the verge of bankruptcy (See LAW, JOHN). Dubois obtained most of the authority in the government, while the regent gave himself up to a life of dissipation. He resigned the government to Louis XV in 1723.

Ormuz, *or'mooz,* or **Hormuz,** an island in the Persian Gulf, on its north side, near its entrance. It is about 12 miles in circumference, is entirely destitute of vegetation and is of importance only as having been once a great trade center. In the fifteenth, sixteenth and seventeenth centuries, it is said to have had a population of 40,000, and it retained its importance until the early seventeenth century, when it was taken by the English and given to the shah of Persia, who destroyed the chief city and transferred its trade to the mainland.

Or'muzd, the name of the supreme deity of the ancient Persians. According to the doctrine of Zoroaster he was the lord of the universe and the creator of earthly and spiritual life, the source of light, wisdom and intellect and the giver of all good. See ZOROASTER.

Ornithol'ogy, that branch of zoölogy which treats of birds, their description, habits and relationship to man. See BIRDS.

Ornithorhynchus, *or'ni tho rin'kus.* See DUCK-BILLED PLATYPUS.

Orontes, *o ron'teez,* a river of Syria, which rises in the Lebanon Mountains, flows northward, then westward and empties into the Mediterranean Sea. Its length is about 200 miles. It is not navigable. The scenery on its banks for part of its course is very beautiful.

Orpheus, *or'fe us,* in the mythology of Greece, a famous musician, by some accounts the son of Apollo, with whom he was usually associated in legend. To him is attributed the application of music to the worship of the gods. Apollo presented him with his lyre, or, according to other accounts, Orpheus invented it himself, and the Muses taught him to use it, so that he moved not the beasts only, but the woods and rocks, with its melody. Having lost his wife Eurydice by the bite of a serpent, he descended into Hades in an attempt to bring her back, and his music so moved the infernal deities, Pluto and Proserpina, that they consented to her return to earth, if her husband, whom she was to follow, would not once look back until they had reached the upper world. This condition the impatient Orpheus violated, and so he lost his wife forever. He is said to have met his death at the hands of a band of furious women engaged in the mystic rites of Bacchus. Another version says that he was slain by Jupiter because his power of bringing back the dead was not in accord with the laws of nature. His rescue of Eurydice and his death at the hands of the Thracian women were favorite subjects for artists.

Orris Root, the root of several species of iris, especially of the European iris, which, on account of its violet-like smell, is employed in perfumery and in the manufacture of tooth powder. It was formerly used as a medicine.

Orsini, *or se′ne,* one of the most illustrious and powerful families of Italy. It became known about the eleventh century and had already acquired high rank and extensive possessions in the Papal States, when one of its members, Giovanni Gaetano, was raised to the pontificate under the title of Nicholas III (1277–1280). The feud between the Orsini and Colonna families is celebrated in history; it commenced toward the close of the thirteenth century and is distinguished for bitterness, unscrupulousness and violence, assassination being not infrequently resorted to. Many of the Orsini became famous military chiefs. Vincenzo Marco Orsini (Benedict XIII) succeeded Innocent XIII as pope in 1724

Orsini, Felice (1819–1858), an Italian revolutionist. In 1838 he was sent to study law at the University of Bologna and joined the Society of Young Italy, formed by Mazzini. In 1843 he took an active part in an insurrection, and, being apprehended along with his father, he was sentenced to the galleys for life. By the amnesty of 1846 he obtained his freedom, but soon after he again engaged in intrigues under Mazzini and took a prominent part in the stirring events of the following years. Forced to flee from the country, he escaped to London, where he wrote his work, *Austrian Dungeons in Italy,* and lived by giving lectures on his adventures. He now planned, in connection with three companions, the assassination of Napoleon III, whom he regarded as the main support of reactionary tendencies in Europe. The attempt was made on January 14, 1858, but was unsuccessful, and Orsini, with one of his companions, was executed.

Orthoceras, *or thos′e ras,* or **Orthoceratite,** a genus of mollusks that were very numerous in a past geologic age, their fossils being abundant in the formations extending from the lower Silurian to the Triassic periods. In structure they resembled the nautilus, except that their shells were straight, instead of curved. The shell was divided into numerous chambers by cross partitions, each of which had a small opening in the center. Some species were small, while others were quite large. The shells of some species found in the Trenton limestone are as large around as a barrel, and the sections found indicate that the animal must have been from twelve to fifteen feet long. In all, about two hundred species have been discovered.

Orthoclase, *or′tho klase.* See Feldspar.

Orthoped′ics, a modern branch of medical science, relating to the prevention and cure of natural deformities. Prevention is accomplished in infants and children by hygienic means, such as pure air, careful nursing and suitable food, clothing and exercise. Cures are attempted by means of mechanical treatment, but are liable to be retarded or become impossible unless treatment is begun soon after the deviation from the natural shape begins. In our time the manufacture of orthopedic apparatus has become highly developed and forms an important branch of trade.

Orthop′tera, a large family of insects, in which the young when first hatched from the egg bear a strong resemblance to their parents. They have four wings, the upper tough and somewhat hardened, lying straight along the body, covering the hinder ones, except when in flight. There are about 10,000 species, including such insects as crickets, cockroaches, grasshoppers and katydids, as well as the odd-looking walking sticks, leaf insects and praying mantis. Some species gather in enormous numbers and cause great destruction to vegetation. See Insects and special articles on the insects mentioned above.

ORTOLAN

Ort′ler or **Ortler Spitze,** a mountain of the Alps, in Tyrol, near the borders of Switzerland, the highest peak in Austria-Hungary. Its height is 12,800 feet. The group to which this mountain belongs is known as the Ortler Group.

Or′tolan, a bird related to the buntings, a native of North Africa and southern Europe. Its throat and the spots around its eyes are yellow, its breast and belly, reddish, the upper part of its body, brown, varied with black. Epicures esteem its flesh very highly, and large numbers are caught annually in the south of France, in Italy and in Cyprus, and are fattened for the table.

Oruro, *o roo'ro,* a town of Bolivia, capital of the Department of Oruro, situated on a plain 12,250 feet above sea level. It was formerly of much importance, but many of its finest buildings are in ruins, and its commercial importance has greatly declined. Tin, copper and silver are exported. Population in 1900, 16,070.

O'ryx, the name of the genus of antelopes represented by the addax, the gemsbok of South Africa and other species, found in large herds, chiefly in the northern portions of the African continent. The horns are very long, spiral and curved backward.

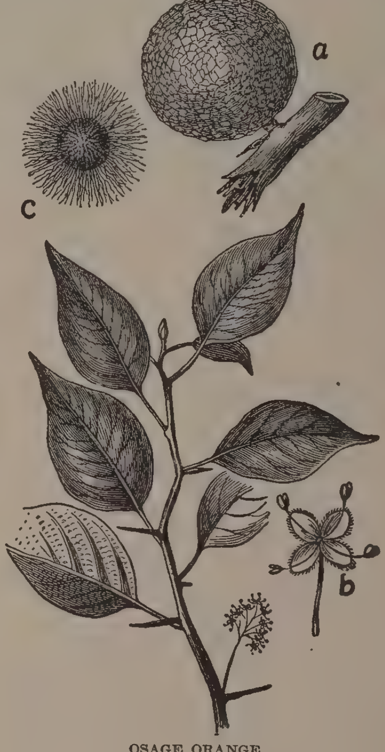
Osage, *o'saje,* a once important Siouan tribe of indians, now living on a reservation in Oklahoma and enjoying the distinction of being the richest tribe in the United States, as every man, woman and child in the tribe draws an annual income from the United States of not less than $300. Originally they occupied extensive territory in what are now the states of Missouri, Arkansas and Kansas and were considered a treacherous, faithless people.

Osage, a river which rises in Lyon co., Kansas, flows eastward and after a course of about 500 mi. enters the Missouri River 9 mi. below Jefferson City. It is navigable for small vessels for about 200 miles from its mouth.

Osage Orange, a tree native to North America, especially to the southwestern United States, where it is frequently used as a hedge plant. The wood is yellow, tough and satiny and was formerly much used for bows by the indians. The tree grows to a height of thirty to sixty feet and produces a large, yellow fruit of woody texture, somewhat resembling an orange, but not edible.

Osaka, *o sah'ka,* or **Ozaka,** *o zah'ka,* a city of Japan, in the island of Hondo, on the Yodo River and on the shore of Osaka Bay, 37 mi. s. w. of Kioto, with which it is connected by railway. It is intersected by canals, which are spanned by numerous wooden bridges, and this peculiarity has won for it the name of the "Venice of the East." It has theaters and other places of amusement, many temples and a famous castle. Its chief industries are the manufacture of cotton, glass and iron and steel products, and shipbuilding. There are also numerous other less important manufactures. Its foreign trade is considerable, although the harbor is not very good and the trade by no means equals that of Kobe or of Yokohama. It commands much of the commerce of the interior. Population in 1903, 995,945.

Os'car I (1799–1859), king of Sweden and Norway, son of Charles XIV John. During the reign of his father he was three times viceroy of Norway, where he made himself popular by his just administration. He acceded to the throne in 1844, reformed the civil and military administration of the state, abolished primogeniture, established complete liberty of conscience, encouraged education and agriculture and removed the political disabilities of the Jews. He took little part in foreign politics.



OSAGE ORANGE
a, fruit; *b*, sterile flower; *c*, fertile flower.

Oscar II (1829–1907), king of Sweden and Norway from 1872 to 1905; from the latter date, king of Sweden only. Although he showed himself from the first willing to grant concessions to the Norwegians, he steadily opposed their efforts for independence. Despite his opposition, however, matters came to a crisis in

1905, and Norway was lost to him. Oscar was a writer of some merit; he translated Goethe's *Tasso* into Swedish and published several volumes of lyric poetry.

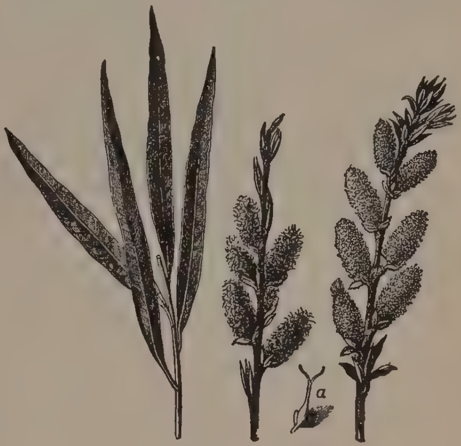
Osceola, *os e o'la,* (1804–1838), a celebrated indian chief, the son of a white man and of the daughter of a Creek chief. While quite young Osceola became influential with the Seminole, whom he had joined, and soon, as their chief, became the strongest opponent of the whites. His wife, the half-breed daughter of a negro slave, was seized and carried away by the former owner of her mother. This so embittered Osceola that he became one of the most terrible enemies the whites ever had. Imprisonment and punishment did not subdue him, and he took murderous revenge at every opportunity. In October, 1837, while carrying a flag of truce to General Jessup, he was treacherously seized and kept a prisoner in Fort Moultrie until his death.

OSCEOLA

Ösel, *ö'zel,* or **Oesel,** an island in the Baltic Sea, belonging to the Russian Government of Livonia, situated at the entrance to the Gulf of Riga. Its area is about 1000 square miles. The surface of the island is undulating; the climate is mild, and grains, including wheat, can be produced. Agriculture, the rearing of horses, and fishing are the principal occupations of the inhabitants. Population, estimated at 42,000.

Osh'kosh, Wis., the county-seat of Winnebago co., 80 mi. n. w. of Milwaukee, on Lake Winnebago, at the mouth of the Upper Fox River, and on the Wisconsin Central, the Chicago & Northwestern and the Chicago, Milwaukee & Saint Paul railroads. A state normal school is located here, and the city has a public library, Saint Mary's Hospital and several parks. Other important buildings are the city hall, the county courthouse and the Federal building. The lake affords fine fishing, yachting and ice boating, and there is good hunting in the vicinity. State and county hospitals for the insane and the county poor farm are near the city. Oshkosh has an important trade in lumber and extensive manufactures of lumber products, such as sash, doors, blinds, matches and furniture. There are also manufactures of machinery, boilers, twine, matting, flour, tobacco, liquors and other articles. The place was settled in 1836 and was chartered in 1853. Four different times during its history it has been greatly damaged by fires. Population in 1905, 30,575.

Osier, *o'zhur,* the name of the willows which are used for making wicker work. The common osier is a European tree, growing in wet grounds, where it is often planted to prevent the washing away of banks. Among the best varieties are the fine basket osier, the green-leaf osier, or ornard, the Spanish rod and the golden osier. Osiers are grown extensively in Holland, Belgium and France, where they form an important commercial product.



OSIER
a, fertile flower.

Osi'ris, one of the great Egyptian divinities, the brother and husband of Isis and the father of Horus. He was styled the manifestor of good, lord of lords and king of the gods, and he represented the sum of beneficent agencies, as

Set represented evil agencies. Osiris, after having established good laws and institutions throughout Egypt, was murdered by his brother Set and became afterward the judge of the dead. There are a multitude of traditions, both Greek and Egyptian, about Osiris. He is represented under many different forms, and is compared sometimes to the sun and sometimes to the Nile. His soul was supposed to animate the sacred bull, Apis, and thus to be continually present among men. His worship extended over Asia Minor, Greece and Rome; the rise of Christianity put an end to it.

Os′kaloo′sa, Iowa, the county-seat of Mahaska co., about 60 mi. s. e. of Des Moines, on the Chicago, Rock Island & Pacific, the Chicago, Burlington & Quincy and other railroads. The city is in a fertile agricultural and stock-raising district. There are extensive deposits of coal, limestone and clay in the vicinity. The principal industrial establishments are flour and grist mills, brickyards, a large packing house, and wagon, heater and other factories. The city contains the Penn College, Oskaloosa College, a business school and a public library. The annual state meeting of the Society of Friends is held here. The place was settled in 1843, and the city was incorporated in 1853. Population in 1905, 10,203.

Osmium, *oz′mi um,* a bluish-white metal, with a bright luster, closely related to platinum. It is the heaviest of all substances, being twenty-two and one-half times heavier than water. Osmium is the most infusible of all the metals. It combines with chlorine in different proportions, also with sulphur, and forms alloys with some other metals. Osmic acid acts as a powerful oxidizer, removing the carbon from indigo, separating iodine from potassium iodide and converting alcohol into acetic acid.

Osmo′sis, the name given to the interchange which takes place between liquids when they are separated by a membrane. For instance, if a bladder containing a strong solution of sugar be placed in a receptacle containing water, it will be found after a time that a considerable quantity of water has passed through the membrane into the bladder, making it noticeably fuller. On the other hand, there has been a passage of the denser fluid into the water. The flow from the vessel into the bladder, or the inward flow, is called *endosmosis,* and the flow from the bladder into the passage, or the outward flow, *exosmosis.* The flow is usually unequal, the greater flow being from the light to the denser liquid. When the fluids become of the same density, osmosis ceases.

Osmosis is one of the most essential processes in the growth of plants. The protoplasm is confined within the cells, the walls of which are a thin membrane. Water and any substances it may hold in solution can pass through this membrane, but the protoplasm has the power of selecting those substances which are needed for its own growth; thus, it absorbs from the circulating cell the necessary nutriment. It is supposed that by this means the circulation of nutritious fluids is maintained in plants, though the subject is not perfectly understood.

Os′nabrück (sometimes called *Osnaburg*), a town of Prussia, in Hanover, capital of the district of Osnabrück, on the Hase, about 74 mi. w. s. w. of Hanover. In the old town there are many interesting buildings, among which are the Catholic Cathedral and the Gothic Church of Saint Mary, which dates from the fifteenth century. It was formerly an important center of linen manufacture. Among the important industries are iron founding, tanning and the manufacture of machinery, boilers, nails, pipes, musical instruments, rugs, cotton goods, paper and brick. Population in 1900, 51,574.

Osprey, *os′pray.* See Fish Hawk.

Os′sining, N. Y., a village in Westchester co., 31 mi. n. of New York City, on the east bank of the Hudson River and on the New York Central railroad. It is a beautiful residence place, located on an elevated site, at the widest point of the Hudson River, known as Tappan Sea. The famous Sing Sing State Prison is located just outside the village. Other features of interest are the arch of the Croton Aqueduct and the arched highway bridge. The village contains foundries, machine shops and manufactures of medicines, shoes, leather and other articles. The place was settled about 1700 and was incorporated as a village in 1813. Until 1901 it was known as Sing Sing, which is an indian name meaning *stony place.* Population in 1905, 7135.

Os′soli, Sarah Margaret Fuller, Marchioness (1810–1850), an American critic, born at Cambridge, Mass. She was remarkably precocious and for this reason was given an education which taxed her strength and permanently injured her health. Through her brilliancy, and especially her conversational powers, she attracted the attention of the most eminent men of New England and became closely associated with the Transcendentalists. For a time she was the editor of their journal, *The Dial,* but although she was interested in Brook Farm and often visited it, she never became a member of the company there, because she saw the unpractical character of the idea. Her first original volume was *Summer on the Lakes,* and she also wrote *Women in the Nineteenth Century.* Her chief contributions to literature, however, were essays on art and literature, published in the New York *Tribune.* She went to Europe in 1846, married in the next year the Marquis d'Ossoli and remained in Rome during the Revolution of 1848, serving in the Roman hospitals during the French siege of 1849. In the next year she embarked with her husband and her son for the United States, but the vessel was wrecked off Fire Island Beach, near New York, and all were drowned. See TRANSCENDENTALISM; BROOK FARM.

Ostend', a seaport of Belgium, in the Province of West Flanders, on the North Sea, 14 mi. from Bruges. It is one of the most fashionable of European watering places, and in some years as many as 50,000 visitors come to the town during the season. The Kursaal, a magnificent building, is the center of the social life during the season. Cod and herring fishing and the cultivation of oysters are considerable industries. The city was built in the ninth century. It sustained a memorable siege by the Spaniards from 1601 to 1604, when it surrendered to Spinola. Population in 1904, 41,181.

Ostend Manifes'to, a famous dispatch signed at Ostend, October 9, 1854, by James Buchanan, John Y. Mason and Pierre Soulé, at that time United States ministers to Great Britain, France and Spain, respectively. It declared that the purchase of Cuba from Spain by the United States would be highly desirable, but that if Spain refused to sell, the United States should forcibly acquire the island. The meeting of the ministers was at the suggestion of President Pierce, but its results were brought about by the active interest of the pro-slavery party, who desired an extension of territory and who had long been assisting filibustering expeditions to Cuba and others of the West Indies. The declaration was condemned by all parties in the United States.

Os'teop'athy, a method of curing disease without drugs. It is based on the assumption that the fluids of the body contain greater or less amounts of every kind of chemical substance and that this store is capable of destroying every disease. The chief cause of disease is the slight displacement of some bone of the body, which causes an obstruction to the flow of these fluids, or a lack of nervous energy in certain muscles or organs. To cure any disease, therefore, is to locate the disarranged bone or bones, and make the proper adjustment. Andrew Taylor Still, the founder of osteopathy, was a practicing physician and surgeon of the old school, but he became dissatisfied with that method of curing. He announced the system in 1875 and practiced it with considerable success. Now there are over 3000 practitioners, with about 1000 students in the various colleges. Twenty-three states have recognized the profession and regulate its practice. The objection made to osteopathy is not so much to the method of curing as to the attempt to adapt it to all kinds of diseases. Many medical schools teach the principles of osteopathy, and a large number of regular physicians use its methods with some classes of patients.

Os'tia, an ancient city of Italy, at the mouth of the Tiber, 15 mi. from Rome. It was of great importance as the port of Rome and as a naval station, and for a long period it engrossed the whole trade of Rome by sea. The port, however, was never good, and owing to the gradual accumulation of mud and other deposits brought down by the river, it ultimately became inaccessible to large ships. Many efforts were made by the various Roman emperors to improve the port, but without much success, and the emperor Claudius had a new harbor dug two miles north of the old town of Ostia. The ruins of Ostia comprise tombs, two temples, a theater and a number of other buildings.

Ostracism, *os'tra siz'm,* (from the Greek word meaning *shell*), a political measure practiced among the ancient Athenians, by which persons considered dangerous to the state were banished by public vote for a term of years (generally ten), with leave to return to the enjoyment of their estates at the end of the period. It takes this name from the shell or tablet on which each person recorded his vote. Among the distinguished persons ostracized were Themistocles, Aristides and Cimon, son of Miltiades. They were afterward recalled.

Os'trich, the largest of existing birds. It inhabits the plains of Africa and Arabia, but is now found wild only in northern Africa. The full-grown male stands seven or eight feet high and weighs 200 pounds or more. It has a flat head, a stout beak, large eyes and small, useless wings. The neck and thighs are nearly bare, but the body is covered with feathers. The males are shiny black, with white wings and tails. The females and young birds are of a dull brown color, and when hatched the chicks are striped. The ostrich is a timid bird and has great speed, often outstripping the fleetest horse. The food of the ostrich in the wild state consists of almost anything in the way of herbs, seeds and fruits that can be obtained, but in captivity the birds are usually fed upon alfalfa or some other form of grass or clover, with occasional variations of fruit. In the wild state several females accompany one male, and all lay their eggs in the same nest, which is a mere hollow in the sand. In warm countries the eggs are left to be warmed by the sun during the day, and the male bird sits upon them at night, but in captivity, when the birds attain their full growth, which is at about four years, they pair, and each pair is kept in a separate enclosure. Here the nest is made, and about eighteen eggs are laid, upon which the female and male take turns in sitting, the female sitting during the day and the male at night.

OSTRICH

Large ostrich farms have been established in the southern part of California, in Arizona, in British South Africa and in other countries where the climate is suitable for the raising of these birds, and the industry has proved very profitable. The black and white plumes are obtained from the male bird, and the brown ones from the female. The feathers vary in value, according to size and quality, from a few cents to as high as fifty dollars a plume.

Os'trogoths. See Goths.

Oswe'go, N. Y., the county-seat of Oswego co., 36 mi. n. w. of Syracuse, on Lake Ontario, at the mouth of the Oswego River and at the outlet of the Oswego Canal, and on the Lackawanna, the New York Central and other railroads. The city is on a slight elevation above the lake and has six parks, broad streets and pleasant drives along the river and lake shore. It contains a state normal school, Garritt-Smith Library, a good Federal building, a city hall, a courthouse and a state arsenal. The city has an excellent harbor and conducts a large trade in coal, grain and lumber. There are machine shops, boiler and engine works, a large starch factory, knitting mills and other works. Oswego was established as a military and trading post about 1724 and was chartered as a city in 1848. During King George's War and the French and Indian War, it was regarded as a very important position and was the scene of numerous engagements. Population in 1905, 22,572.

O'tho I (called *the Great*) (912–973), emperor of Germany and founder of the Holy Roman Empire. He succeeded his father, Henry I, as king of Germany in 936 and was immediately compelled to go to war to maintain his right to the throne. After a struggle of many years he subdued the duke of Bohemia and gained possession of the duchies of Swabia, Bavaria and Lorraine. In 951 he went to Italy and there was crowned king of the Lombards, and in 962, after his expulsion of Berengar, who had seized upon the territory bestowed upon the pope by Pippin and Charlemagne, he was crowned emperor at Rome. The pope having violated a pledge made to Otho, Otho invaded Italy and deposed the pope, causing Leo VIII to be elected in his place. He was later involved in a war with the Byzantine Empire, which had refused to acknowledge his right to the Empire.

Otho II (955–983), Holy Roman emperor, son of Otho I. His father before his death had him crowned emperor, that his accession to the throne might be unquestioned. Much of Otho's time was spent in Italy, where he suppressed a rising under Crescentius. He attempted to drive the Greeks from Lower Italy, but the Greeks called the Saracens to their aid, and Otho was defeated in 982. He escaped by leaping into the sea, and was picked up by a Greek ship, from which he contrived to escape. Before his death he had his son Otho crowned as his successor.

Otho III (980–1002), Holy Roman emperor, son of Otho II, whom he succeeded in 983. His mother, his grandmother and his aunt ruled during his minority, but immediately on assuming authority himself, in 996, he showed himself a ruler of much ability. In that year he marched into Italy and crushed a fresh insurrection under Crescentius. On the death of Pope Gregory, Otho placed his old tutor, Gerbert, on the papal throne, as Sylvester II. Peace in Rome was, however, only temporary, and Otho was engaged until his death in putting down disturbances in various parts of Italy.

Otho, MARCUS SALVIUS (32–69), Roman emperor. He joined in Galba's rebellion against Nero and after Galba's accession exercised considerable power and was made consul. Disappointed in his hopes of being chosen Galba's successor, Otho bribed the army, had Galba murdered and was proclaimed emperor in 69. He was acknowledged by the Eastern provinces, but in Germany Vitellius was proclaimed emperor. Vitellius led his army to Rome and defeated Otho, who stabbed himself.

O'tis, ELWELL STEPHEN (1838–), an American soldier, born at Frederick, Md. He was taken in infancy to Rochester, N. Y., where he received his education, graduating at the University of Rochester in 1858. He later graduated at Harvard Law School and began the practice of law at Rochester, but in 1862 he enlisted in the Federal army, served throughout the war and became lieutenant colonel, with the brevet rank of brigadier general of volunteers. He remained in the regular army after the war, became successively colonel, brigadier general, major general of volunteers and major general in the regular army (1900). In 1898 he succeeded Major General Merritt as military governor of the Philippines and was a member of the first Philippine Commission in 1899. He returned to the United States in the following year and retired from the army in 1902.

Otis, HARRISON GRAY (1765–1848), an American lawyer and politician, born in Boston and educated at Harvard University. He soon attained a reputation as an able lawyer and eloquent orator and was elected to the legislature and then to Congress, where he took an active part for a brief period, later filling numerous state offices. He was a prominent figure in the Hartford Convention of 1814 and three years later was elected to the United States senate, where he was a conspicuous opponent of slavery.

Otis, JAMES (1725–1783), an American statesman, born at West Barnstable, Mass., and educated at Harvard University. He practiced law for a time at Plymouth and later at Boston, where he attained a wide reputation. He was elected advocate-general of Massachusetts, but in 1761, when request was made for the issuance of writs of assistance, he resigned and became the leading counsel in opposition, making a notable speech which brought him into active leadership of the patriot party. He added to his reputation by numerous pamphlets against the British policy, especially his *Vindication of the Conduct of the House of Representatives* and *The Rights of the British Colonies Asserted and Proved.* It was at his suggestion that the Stamp Act Congress assembled in 1765, and he was the author of the address sent by it to the House of Commons. He openly defied the royal authorities of the colony and succeeded in checkmating many of their moves against colonial interests. In 1769 he became involved in a dispute with a British officer and received a cut in the head, which resulted in insanity, from which he never fully recovered. He was killed by lightning at Andover.

O'to, a small tribe of Siouan indians, now living on a reservation in Oklahoma, in conjunction with the Missouri.

Otranto, *o trahn'to,* STRAIT OF, the channel, 40 mi. in width, which connects the Adriatic with the Ionian Sea.

Ot'tawa, an important tribe of Algonquian indians who occupied the Upper Ottawa River in Canada. They were friends of the French and so were brought into disastrous conflict with the Iroquois and later with the Sioux. They sided with the English against the Americans in the War of 1812. See PONTIAC.

Ottawa, a river in the Dominion of Canada, forming for a considerable part of its length the boundary between the provinces of Quebec and Ontario. It rises in the high land which separates the basin of Hudson Bay from that of the Saint Lawrence, flows first westward, then southward and after a course of about 625 miles discharges into the Saint Lawrence opposite the Isle of Montreal. Six miles above the city begin the Ottawa rapids, which terminate in the Chaudière Falls. The river is navigable for only about 250 miles, owing to various rapids and cataracts. Immense quantities of timber are floated down the Ottawa from the wooded regions of the interior to the city of Ottawa.

Ottawa, the capital of the Dominion of Canada and of Carleton co., Ont., on the Ottawa River, where it is joined by the Rideau, 101 mi. w. of Montreal, and on the Canadian Pacific, the Canada Atlantic, the Ottawa & New York and other railroads. The Ottawa River, which here forms the magnificent cataract known as the Chaudière Falls, furnishes power for numerous foundries, factories, flour mills and saw mills. The principal trade of the city is in its sawed timber, the total amount cut in the mills being hundreds of millions of feet annually. There are also manufactures of iron ware, agricultural implements, machinery and bricks. The city is located in a region of great beauty and is itself one of the finest cities of Canada. Among the notable buildings are the government buildings on Parliament Hill, the Roman Catholic Cathedral of Notre Dame, Christ Church Cathedral, Rideau Hall, the city hall, the postoffice, numerous churches and the public library, or Library of Parliament, which contains over 200,000 volumes. The chief educational institution is the Ottawa Roman Catholic University. The United States consul general is located at Ottawa. The town was settled in 1827 and was made a city, with its present name, in 1854. In 1858 it was selected as the capital of the Dominion. Population in 1909, 80,000. It has greatly increased since then.

Ottawa, Ill., the county-seat of LaSalle co., about 80 mi. s. w. of Chicago, at the confluence of the Fox and Illinois rivers, on the Illinois & Michigan Canal and on the Chicago, Rock Island & Pacific and the Chicago, Burlington & Quincy railroads. The city has a very beautiful location and is the seat of Pleasant View College and Saint Francis Xavier Academy. It has a high school library, Odd Fellows' and Reddick's public libraries, Ryburn Hospital, the Illinois Appellate Court building and four public parks. There are deposits of coal, clay and glass sand in the vicinity, and the city has manufactures of implements, pianos, organs, glass, pottery and other clay products, wagons and various other articles. It was settled about 1830 and was incorporated as a city in 1853. Population in 1900, 10,588.

Ottawa, Kan., the county-seat of Franklin co., 40 mi. s. e. of Topeka, on the Marais des Cygnes River and on the Atchison, Topeka & Santa Fé and the Missouri Pacific railroads. Ottawa University is located here, and the city has a Carnegie library, about a score of churches and Forest Park, where the county fair and Chautauqua assemblies are held. The notable buildings include the county courthouse, the First Baptist Church, the First Methodist Church and the Rohrbaugh Theater. There are large nurseries, grain elevators, railroad shops, flour mills, creameries, foundries and other factories, and the city also has a good trade in grain, wool and live stock. The place was founded by John Tecumseh Jones, a missionary to the indians. Population in 1905, 7727.

OTTER

Ot'ter, a flesh-eating mammal that frequents the water. Different species are found in various parts of the world, differing in size and in the nature of their fur. They all have large, flattish heads, short ears, webbed toes, crooked nails and tails slightly flattened horizontally. The common *river otter* inhabits the banks of rivers, feeds principally on fish and is often very destructive, particularly to salmon. The under fur is short and woolly, the outer is composed of longer and coarser hairs of dark brown hue. These otters burrow near the water's edge, line their nest with grass and leaves and produce from four to five young. The *American,* or *Canadian, otter* averages about four feet in length, inclusive of the tail. It is plentiful in Canada and is valuable for its fur, which is a deep reddish-brown in winter and blackish-brown in summer. The sea otters, represented typically by the *great sea otter,* inhabit the coasts of the North Pacific Ocean, but are of comparatively rare occurrence. The tail is short, measuring about seven inches. Their valuable fur is soft and of a deep, lustrous black, or of a dark maroon color when dressed. In general appearance the sea otter somewhat resembles a small seal. In China, otters are sometimes partially domesticated and taught to fish for their masters.

Ot'to I (1815–1867), king of Greece, son of Louis I of Bavaria. He was elected king of Greece in 1832, and for three years the power was exercised by a regency. A revolution in 1843 forced Otto to agree to a constitution, but his rule was never popular, and in 1862 insurrections again began. In the following year Otto was obliged to flee, but he never formally abdicated.

Ot'toman Empire. See TURKEY.

Ottum'wa, IOWA, the county-seat of Wapello co., about 80 mi. s. e. of Des Moines, on the Des Moines River and on the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Wabash and other railroads. The city is in a productive agricultural region, which also contains valuable coal mines. It has good water power and contains extensive iron works, foundries, packing houses, implement works and other factories. There are coal and lumber yards and grain elevators, and a considerable trade in farm products, live stock and fruit is carried on. Some of the prominent structures are the courthouse, the Federal building, an opera house, a Y. M. C. A. building, the Union passenger station and the public library. Ottumwa was settled in 1849 and was incorporated in 1851. Population in 1905, 20,181.

Ouachita, *wosh'i ta,* **River.** See WASHITA RIVER.

Oudh, *owd,* a region of British India, forming part of the United Provinces of Agra and Oudh. It lies south of the Himalayas and north of the Ganges, and its area is about 25,000 square miles. It is a vast alluvial plain, watered by the Ganges and its tributaries, of which the most important are the Gogra and the Gumti. It is for the most part highly fertile, and wheat, rice, barley, sugar, indigo, opium and tobacco are raised in large quantities. Oudh, formerly a Mogul province, became in the eighteenth century an independent state under a Mohammedan dynasty. In 1856 complaints of the misgovernment of the princes of Oudh led to the annexation of the country to British territory. This measure, however, produced much dissatisfaction, and when, in 1857, the Sepoy Mutiny broke out, most of the Oudh Sepoys joined it, and the siege of Lucknow resulted. Lucknow is the capital of the province and the main center of population and manufactures (See LUCKNOW). Population in 1901, 12,833,077.

Ouida, *we'dah.* See RAMÉE, LOUISE DE LA.

Ounce (Latin, *uncia,* a twelfth part of any magnitude), in Troy weight, the twelfth part of a pound, containing 480 grains; in avoirdupois weight, the sixteenth part of a pound, containing 437½ grains Troy.

Ounce, also called *snow leopard,* a carnivorous animal, found in North Africa, Arabia, Persia, India and China, resembling the leopard, but having longer, coarser hair, more bushy tail and a darker color. It is found particularly in rocky regions, and feeds on goats, sheep and other mammals. In some places it is trained to hunt, like the cheetah. The name is often misapplied to the South American jaguar.

Ouro Preto, *o'ro pra'to,* a town of Brazil, formerly the capital of the State of Minas Geraes, 200 mi. n. of Rio de Janeiro, with which it is connected by rail. It was formerly one of the great mining centers of Brazil, but its gold mines are now nearly exhausted. It has cotton and other manufactures. Population, about 13,000.

Ouse, *ooz,* a river of Yorkshire, England, formed by the junction of the Swale and the Ure. It flows southeast past York and Selby and joins the Trent to form the Humber. Its total length is 130 miles, for about 45 of which it is navigable.

Ouse, GREAT, a river of England which rises near Brackley, flows in a general northeasterly direction and falls into the Wash at King's Lynn. Its length is about 160 miles, and it is navigable for about 100 miles.

Outram, *oo'tram,* JAMES, Sir (1803–1863), a British soldier and statesman, born in Derbyshire and educated at Aberdeen. He went to India and in 1828 was selected to undertake a mission to the wild hill tribes of the Bombay presidency, a task in which he acquitted himself with credit. As adjutant to Lord Keane, he took part in the Afghan War of 1839, and distinguished himself at the capture of Khelat and by his dangerous ride through the enemy's country. From that time to his death he was conspicuous in Indian affairs. During the Indian Mutiny, although of higher rank than Havelock, whom he joined with reënforcements at Cawnpore in September, 1857, he fought under Havelock till Lucknow was relieved by Sir Colin Campbell.

Ouzel, *oo'z'l,* the name given to several birds. The *common,* or *ring, ouzel* of Europe is a bird of the thrush family, marked by a crescent-shaped patch or stripe of white across its breast. The name ouzel was in ancient times given to the blackbird. For the American water ouzel, see DIPPER.

Ovampos, *o vahm'poze,* black tribes of the Bantu group of Southwest Africa, occupying the exceedingly fertile country which lies south of the Cunene River. The men, who resemble the Kaffirs and Damaras in feature and form, are peaceful and intelligent, living in rude conical huts, cultivating the soil and herding cattle. Cattle form the wealth of the Ovampo tribes, each of which has its own hereditary chief.

Oven, *uv'en,* **Bird,** the common name of a thrush which builds nests roofed over something like an oven. This bird nests commonly in northern parts of the United States. A genus of small South American creepers which build oven-shaped nests is also given the same name.

O'vershot Wheel, a wheel driven by water shot over from the top. The buckets of the wheel receive the water as nearly as possible at the top and retain it until they approach the lowest point of the descent. The water acts principally by its gravity, though some effect is of course due to the velocity with which it arrives. See WATER WHEELS.

Ov'id (43 B. C.–18 A. D.), the common designation of Publius Ovidius Naso, a celebrated Roman poet. He received a careful education, which was completed at Athens, where he gained a thorough knowledge of the Greek language. He afterward traveled in Asia and Sicily. Till his fiftieth year he continued to reside in Rome, enjoying the friendship of a large circle of distinguished men. By an edict of Augustus, however, in 8 A. D., he was commanded to leave Rome for Tomi, a town on the inhospitable shores of the Black Sea, near the delta of the Danube. It is impossible now to come to any certain conclusion as to the cause of this banishment, that given in the edict—the publication of the *Art of Love*—being merely a pretext, as the poem had been in circulation ten years previously. Ovid died at Tomi. His works include, among others, love elegies, letters of heroines to their lovers or husbands, *Art of Love, Love Remedies* and *The Metamorphoses,* his best-known work. Ovid's poetry shows no depth of thought and little genuine feeling, but is attractive by reason of its musical qualities.

O'waton'na, MINN., the county-seat of Steel co., 65 mi. s. of Saint Paul, on the Straight River and on the Chicago & Northwestern, the Chicago, Rock Island & Pacific and other railroads. The city is in an agricultural region, producing corn, wheat and nursery stock. Owatonna contains creameries, flour mills, foundries, machine shops and automobile, carriage, engine and other factories. There are three parks and many fine private residences, while the principal public buildings are the courthouse, the opera house, the public library and a hospital. The city also contains the state school for dependent children, Pillsbury Academy and the Sacred Heart Academy. It was settled in 1853 and was incorporated ten years later. Population in 1905, 5651.

Owe'go, N. Y., the county-seat of Tioga co., 21 mi. w. of Binghamton, on the Susquehanna River, at the mouth of the Owego Creek, and on the Erie, the Delaware, Lackawanna & Western and other railroads. The village is an attractive residence place and has become a popular summer resort. It has the Owego Free Academy, Coburn Library, and a fine courthouse. There are bridge works, glove factories, wagon works, saddleries and other factories, and the village has a considerable trade in farm produce and lumber. It was settled on the site of a small indian village about 1786 and was incorporated in 1827. Population in 1905, 5010.

O'wen, RICHARD, Sir (1804–1892), one of the most noted English scientists, born at Lancaster and educated in the schools of Edinburgh, Paris and London. He was successively professor of comparative anatomy at Saint Bartholomew's Hospital, professor in anatomy and physiology at the Royal College of Surgeons and superintendent of the natural history department in the British Museum, from which last post he retired in 1883. He was a voluminous writer on his special subjects and was an honorary member of nearly every learned society of America and Europe. Among his works are *Lectures on the*

Comparative Anatomy of the Invertebrate Animals; *Lectures on the Comparative Anatomy of the Vertebrate Animals*, and *History of British Fossil Mammals and Birds.*

Owen, Robert (1771–1858), an English social reformer, born in Wales. He was at the head of a company which bought large cotton mills at New Lanark in Wales, and the reforms which he introduced in the community made him famous throughout Europe. He believed in thorough coöperation and attempted several times to found communities based on this idea. In 1824 he visited America and founded a community at New Harmony, Ind., which, however, proved unsuccessful. Later he returned to England and became an ardent socialist and spiritualist.

Owensboro, *o'enz bur o*, Ky., the county-seat of Daviess co., 112 mi. s. w. of Louisville, on the Ohio River, and on the Louisville & Nashville, the Illinois Central and other railroads. The city is in a farming and stock-raising country, containing valuable timber and deposits of oil, coal, clay, stone, iron and other ores. It has about fifty manufacturing establishments, including tobacco factories, woolen, flour and planing mills, a large cellulose factory and various other works. The Owensboro Female College and the Saint Joseph Francis Academy are located here. The city has more than a score of churches, eight banks, electric street railways, waterworks, electric light plant and Hickman Park. It was settled as Yellow Banks in 1798, was made the county-seat in 1815 and was given its present name in honor of Colonel Abraham Owen in 1818. Population in 1900, 13,189.

Owen Sound, formerly *Sydenham*, a town of Ontario, Canada, the capital of Grey co., and the port of entry on Georgian Bay, at the mouth of the river Sydenham. It is on the Canadian Pacific and the Grand Trunk railroads, 99 mi. n. w. of Toronto. Among its more notable buildings are the townhall, the courthouse and the high school. Its harbor is excellent and can be entered by vessels of the largest capacity. Its industries include tanning, fruit packing and canning, milling, shipbuilding and the manufacture of leather, woolens, cement, brick and tile. Population in 1901, 8776.

Owl, a bird of prey that feeds principally during the night. There are several different species which vary greatly in size and in habits. They all have thick, short bodies, very strong wings, large heads and large eyes, usually surrounded by circles of radiating feathers, which, with the rather dignified movements of the birds, give them an appearance of wisdom that is not wholly justified. The plumage is soft and downy, and their flight is almost noiseless. Their legs, and even their toes, are usually feathered, though in some species they are bare. The toes are so arranged that they can be used like hands for clasping. During the day owls spend their time in crevices of rocks, nooks and crannies of old buildings or hollows of trees, and in such positions they nest, laying from two to five white eggs. When disturbed or wounded, some of them fight fiercely. The *great horned owl* of the United States measures five feet or more from tip to tip of its wings and is usually brown in color, though it varies sometimes to almost white. It is common in most parts of North and South America. Sometimes it is a noisy bird at night, with its lound hooting, but when in search of prey it is so quiet and rapid in its movements that it causes no little destruction among the small wild animals and even among domestic fowls. The *screech owl*, or *barn owl*, is perhaps the most common species in the Eastern United States. It is a small, harmless bird, best known by its shrill, unpleasant cry. In the Western United States a little burrowing owl lives in the homes of the prairie dogs, often in company with rattlesnakes, and it is supposed that the owls and snakes prey upon the young of the prairie dogs. The *snowy owls* are large and handsome birds, with pure white plumage. They hunt by day and are vigorous and fearless in their attacks on birds as large, often, as ducks and partridges. They are found in the cold regions of both hemispheres. The *long-eared owl* appears in the woods of both hemispheres, and the *short-eared owl*, living in more open places, is also found over a very wide territory. In Europe there are a number of well-known species. The "little owl," the one most commonly mentioned in literature, is the one whose note is *to-whit, to-who*. This, too, is the bird that was sacred to Minerva and is still regarded as the symbol of wisdom. In olden times, owls were considered to be birds of ill omen, and they are still regarded by ignorant people with some superstition.

Owos'so, Mich., a city in Shiawassee co., 30 mi. n. e. of Lansing, on the Shiawassee River and on the Grand Trunk, the Michigan Central and other railroads. It is in an agricultural region and contains manufactures of furniture, caskets, screen doors and windows, cars, beet sugar and various other products. The city has a business college, eight churches and three banks, and it owns and operates the waterworks. It was settled in 1836 and was chartered as a city in 1859. Population in 1904, 9145.

Ox. See CATTLE.

Oxal'ic Acid, an acid which occurs, combined sometimes with potassium or sodium, at other times with calcium, in wood sorrel and other plants and in minute quantities in the fluids and tissues of the animal body. Many processes of oxidation of organic bodies produce this substance. Thus, sugar, starch and cellulose yield oxalic acid when fused with caustic potash or when treated with strong nitric acid. Oxalic acid is a solid substance which crystallizes in four-sided prisms, the sides of which are alternately broad and narrow, and the summits, two-sided. They are efflorescent in dry air, but attract a little humidity if it be damp. They are soluble in water, and their acidity is so great that, when they are dissolved in 3600 times their weight of water, the solution reddens litmus paper and is acid to the taste. Oxalic acid is used chiefly in certain styles of calico printing, for whitening leather, as in boot tops, and for removing ink and iron mold from wood and linen. It is a violent poison. *Oxalates* are compounds of oxalic acid with bases; one of them, binoxalate of potash, is well known as salts of sorrel or salts of lemon. The oxalate of lime is an important agent in medicine.

Ox'alis, a little plant of the warm and temperate climates, which flourishes particularly in North America and at the Cape of Good Hope. The leaves of most species are three-lobed and have a distinct sour taste, by which the plants may be easily recognized. The *wood sorrel,* which is very common throughout most parts of North America, is a delicate little plant, with white or pinkish flowers. Another species nearly allied to this has yellow flowers.

Oxenstierna or **Oxenstjerna,** *ok'sen shair'-na,* AXEL, Count (1583–1654), a Swedish statesman, born at Fånö, in Upland, and educated at Rostock, Jena and Wittenberg. In 1603, after visiting most of the German courts, he returned to Sweden and entered the service of Charles IX. In 1608 he was admitted into the Senate; and on the accession of Gustavus Adolphus, he was made chancellor. He accompanied Gustavus Adolphus during his campaigns in Germany, taking charge of all diplomatic affairs; and on the fall of his master at Lützen (1632), he was recognized as the head of the Protestant League. This league was held together and supported solely by his influence and wisdom. In 1636 he returned to Sweden after an absence of ten years, laid down his extraordinary powers and took his seat in the Senate, as chancellor of the kingdom and one of the five guardians of the queen. In 1645 he assisted in the negotiations with Denmark, and on his return he was created count by Queen Christina, whose determination to abdicate the crown he strongly opposed.

Ox'ford, a city and Parliamentary borough of England, county-seat of Oxfordshire, at the junction of the Thames, here called the Isis, and the Cherwell, 55 mi. w. n. w. of London. It is built on a low plain, surrounded by hills, and is a very beautiful city. High street, the principal street, on which stand several of the colleges of the University of Oxford, is one of the finest streets of all England. The oldest building is the castle keep, built in the time of William the Conqueror. Besides the university buildings (See OXFORD UNIVERSITY), the most interesting structures of the town are the municipal buildings, the prison and Saint Mary's, Saint Michael's and Saint Peter's churches. All about the city are beautiful suburbs. Oxford is first mentioned in history in the early years of the tenth century, although it is known that it was in existence somewhat earlier than this. During the Middle Ages it was of considerable importance, and one of the famous occurrences in its history was the assembling in 1258 of the parliament which passed the Provisions of Oxford. The university probably came into existence about the twelfth century, and its growth was steady. During the struggle of Charles I with Parliament, Oxford was the center of the Royalist movement. Although the city was besieged by the army of Parliament, it was not bombarded, and thus its famous buildings escaped destruction. Population in 1901, 49,336.

Oxford Movement. See TRACTARIANISM.

Oxford University, the oldest and most famous English university, located at Oxford, England. The exact date of its founding is not known, but it was probably established early in the twelfth century. The earliest known public document which applies the title of university to the schools of Oxford dates from 1201. The university is a federation of colleges, which were the outgrowth of bands of students gathering together in houses. Sums of money were bequeathed to the university for the erection of buildings and otherwise facilitating study. The first sum for the endowment of chairs or maintaining *masters* was given in 1249, and during the thirteenth century three colleges were founded by separate gifts. By the beginning of the fourteenth century, three other colleges were added, as well as a number of halls, which were merely residences for students and teachers. The system of colleges established at Oxford, and also at Cambridge University, has been continued to the present time and forms a unique organization, which applies only to these two institutions among all the English universities. Oxford now includes Saint Edmund's Hall, and the following colleges for men: University, Balliol, Merten, Exeter, Oriel, Queen's, New, Lincoln, All Souls', Magdalen, Brasenose, Corpus Christi, Christ Church, Trinity, Saint John's, Jesus, Wadham, Pembroke, Worcester, Hartford and Keble. It also has four colleges for women; namely, Somerville, Lady Margaret, Saint Hugh's and Saint Hilda's Halls; but degrees are not conferred upon women.

The constitution provides for the corporation and establishes a board of control for the affairs pertaining to the interests of the university as a whole. It also provides for the organization of each college under a board of control which has jurisdiction over its own affairs. The legislative and executive bodies are the House of Convocation, the House of Congregation, the University of Oxford and the Hebdomadal Council. The Hebdomadal Council is composed of the vice-chancellor, the retiring vice-chancellor, the proctors and eighteen members elected by the congregation, six of whom must be heads of colleges, six professors of colleges and six members of the convocation of at least five years' standing. All legislative measures must originate in the Hebdomadal Council. The executive board is styled the *Chancellor, Masters and Scholars of the University of Oxford*, and includes the chancellor, the high steward, the vice-chancellor, the proctors, the clerks of the market, the keepers of archives and the registrar. The chancellor and high steward are honorary officials. The vice-chancellor is elected from heads of the colleges and serves for four years. He is the executive head of the university. The discipline is in the hands of proctors.

The curriculum of the university embraces a wide range of subjects, including nearly all branches of knowledge, and all degrees of collegiate rank are conferred. The conferring of degrees is based upon examinations, all of which are in charge of the university and not the colleges. The greatest possible freedom is allowed in the pursuit of subjects and in instruction, most of which is in the form of lectures, and each student is at liberty to choose the subjects he prefers. Oxford is of especial interest to the United States, because of the provision in the will of Cecil Rhodes, by virtue of which two students from every state and territory are given support, to the amount of $1500 a year each, for completing courses in the university. See Rhodes Scholarships.

Ox'us, the old name of the Amu River. See Amu.

Oxygen, *oks'i jen*, a gas, the most widely distributed of all the elements. By weight, eight-ninths of water, one-fourth of air and about one-half of silica, chalk and alumina consist of oxygen. It enters into the constitution of nearly all the important rocks and minerals; it exists in the tissues and blood of animals. Without it we could not live, and by its agency disintegration of the animal frame is carried on after death. All processes of respiration are carried on through the agency of oxygen, and all ordinary processes of burning and of producing light are possible only in the presence of this gas. Oxygen was first isolated in 1774 by Joseph Priestley, who gave to the new gas which he had discovered the name of *dephlogisticated air*. Lavoisier, the year following Priestley's discovery, put forward the opinion that the new gas was identical with the substance which exists in common air and gave it the name of oxygen —from the Greek *oxys*, acid, and the root *gen*, to produce—because he supposed that it was present as the active constituent in all acids. Modern experiments, however, prove that it is not necessary in all cases to acidity or combustion.

Oxygen is invisible, inodorous and tasteless; it is the least refractive, but the most magnetic of all the gases. It is 1.1056 times heavier than air and is soluble in water to the extent of about three volumes in 100 volumes of water at ordinary temperatures. Oxygen was liquefied for the first time in 1877 by the application of intense cold and pressure; it has even been solidified. It is possessed of very marked chemical activity, having a powerful attraction for most of the simple substances, the act of combining with which is called oxidation. Some substances when brought into contact with this gas unite with it so violently as to produce light and heat; in other cases oxidation is much more gradual, as in the rusting of metals.

The presence of oxygen is, so far as we know, one of the physical conditions of life. In inspiring we receive into the lungs a supply of oxygen; this oxygen is carried by the blood to the various parts of the body and is there deposited to do its work of tissue forming. The deoxygenated blood returns to the lungs and again receives a fresh supply of the necessary oxygen. In medicine, oxygen is administered in its gaseous form in the later stages of pneumonia, in bronchitis, in wasting diseases and in cases of asphyxiation. Water charged with oxygen is administered in cases of dyspepsia or headache, as well as in other diseases. Trees and plants evolve oxygen, which is formed by the decomposition of the carbonic acid absorbed by the leaves from the atmosphere. This is due to the action of the sun's rays and the chlorophyll, or green coloring matter, of the leaves. When oxygen unites with another element, the product is called an *oxide.* The oxides form a most important series of chemical compounds. Oxygen exists also in a peculiar form different from that of the ordinary gas (See OZONE).

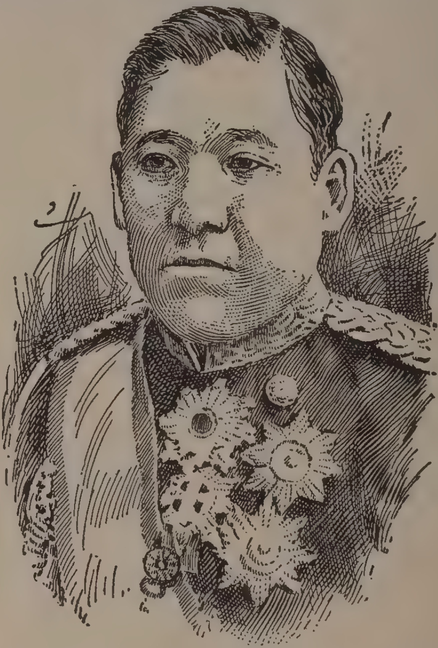
Oxygenated, *oks'i jen a'ted,* **Water.** See HYDROGEN DIOXIDE.

Oxyhy'drogen Blowpipe, an apparatus for burning hydrogen in oxygen. An intensely hot flame is created, in which a steel watch spring will burn with brilliant sparkling explosions.

Oxyhydrogen Light. See LIME LIGHT.

Oyama, *o yah'mah,* IWAO, Marquis (1842–), field marshal of the Japanese army. He was born in Satsuma, and during his youth had for a tutor Saigo Nanshu, a relative, one of the greatest military geniuses of Japan. In the Japanese war of restoration, in 1868, when the forces of the emperor fought against those of the Shogun for the restoration of the sovereign power to the emperor, Oyama fought under Saigo for the emperor, but in the civil war some ten years later, when Saigo, with other Satsuma men, revolted against the emperor, Oyama stayed with the imperial forces, and at the head of a division of troops he succeeded by brilliant skill and courage in bringing victory to the army of the emperor. His later positions were chief of police, associate minister of the interior, vice-minister of war and minister of war. In 1884 he was appointed chief of the general staff, and in the war between China and Japan he was in command of the second army. In the Russo-Japanese War, Oyama won distinction and gave evidence of great strategical and engineering genius.

Oyster, a salt-water mollusk, highly esteemed as an article of food (See MOLLUSCA). The oyster is distinguished by a rough shell of two valves, the under one being larger than the upper. It has no mouth; but a fringed mantle, which extends along the entire opening of the shell, serves to collect food, which is assimilated in a central stomach. The valves of the shell are held together by a strong muscle, whose point of attachment is indicated by the deep blue mark found on the inside of the shell. Oysters are propagated by eggs or spawns. The eggs are so minute that they appear like a milky fluid in the water. The young oysters are for a time able to move about, but as they develop, they attach themselves to some hard, smooth object, where they remain during life. A number attach themselves to one another, forming quite large masses, with distorted shells. The oyster is found in the Atlantic, off the coasts of America and Europe, in temperate latitudes. It prefers rather shallow water, with a smooth, sloping bed of gravel or mud, in a location where the tide washes in upon it such substances as constitute its food.



MARQUIS OYAMA

Because of their delicate flavor and nutritive qualities, oysters are highly valued as food. In the United States oyster fishing is an important industry in Chesapeake Bay, where the oysters are found in largest numbers, and at various other places along the Atlantic coast as far north as Maine. The natural beds have been nearly exhausted, and *oyster farming*, or oyster culture, is now a well-established occupation in many localities. A suitable place for a bed is selected and cleared of rocks or other objects which would interfere with the growth and gathering of the oysters. This is then marked by buoys and stocked with seed obtained from other beds. After stocking, the bed requires very little attention. The oysters attain their growth in about three years. They are usually obtained by dredging, which consists of dragging the bed with an iron rake that detaches the oysters from the bottom and collects them.

Oysters are placed on the market in the shell, in bulk and in cans. The canning is usually done near the place where the oysters are grown. Bulk oysters are taken from the shell immediately after they are drawn from the water and are shipped in pails containing ice. When shipped in the shell, the shells are packed in boxes of ice, since the oyster must be kept cool or it soon loses its flavor.

Oysters suffer from numerous enemies which prey upon them, especially when young. One of the worst of these pests is the starfish, which fastens upon the oyster, drills a hole through the shell and absorbs its nutriment.

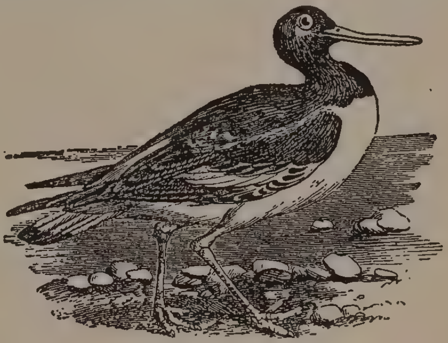
Oyster Catcher, a wading bird, common along the sea coasts of Europe and the rivers of central Africa. It has a peculiar, strong, straight and sharp-edged bill, cut off abruptly at the end. The oyster catchers run, swim and dive with skill and have a strong, rapid flight. Their food consists of mollusks and other sea animals.

Ozaka, *o zah′ka.* See OSAKA.

Ozark′ Mountains, a group of hills which covers the greater part of southern Missouri and northern Arkansas and extends for some distance into Kansas. The greatest height is not much over 2000 feet, and the average elevation is considerably less than this. The Ouachita Mountains, south of the Arkansas River, are a continuation of the Ozark Mountains.

Ozocerite, *o zo se′rite,* or **Ozokerite,** a fossil resin, of a pleasantly aromatic odor, existing in the bituminous sandstones of the coal measures, occurring chiefly in Galicia, in Austria and in Emery and Uintah counties, Utah. Its color is brown or green, but when purified it forms a hard white wax resembling paraffin, from which excellent candles are manufactured. It is used to some extent in adulterating beeswax.

O′zone, a colorless gas, with an odor resembling that of weak chlorine. It is a modified form of oxygen, in which three volumes of oxygen are condensed to two. Ozone exists in small quantities in pure country air and is produced in various ways. When an electric machine is set in operation or after a discharge of lightning, the peculiar smell of ozone may be noticed. Ozone acts as a very powerful oxidizer; for this reason it is of great service in the atmosphere, as it renders comparatively harmless the dangerous and obnoxious products of animal or vegetable putrefaction. Ozone rapidly bleaches indigo, converting it into a white substance called isatin, which contains more oxygen than the indigo itself.



OYSTER CATCHER

P

P, the sixteenth letter in the English alphabet, has varied considerably in form from its Phoenician original, the greatest change taking place in the transition from Greek to Latin, when the short perpendicular limb was bent around to join the longer. In all of these languages, however, it stood for the same sound, which it still retains in English. At the beginning of a few foreign words, as *psalm,* and before *t* in a few words, as *receipt, p* is silent. It forms a part of one digraph, *ph.*

The most important use of *P* as an abbreviation is for the Latin *post,* in such expressions as P. M., afternoon, P. S., postscript.

Pachuca, *pa choo'ka,* a city of Mexico, capital of the State of Hidalgo, 55 mi. n. e. of Mexico City. It is situated at a height of more than 8000 feet above the sea, in the midst of a rich silver mining region. The mines in its vicinity are among the richest in Mexico and produce many thousand tons of ore each year. Population in 1900, 37,487.

Pacific Ocean (formerly called, also, the *South Sea*), that immense expanse of water which extends between the North and South American continents and Asia and Australia. It is the largest of the oceans, exceeding in compass the whole of the four continents taken together, and occupying more than a fourth part of the earth's area and fully one-half of its water surface. On the west it extends to the Indian Ocean and has several more or less distinct seas connected with it—China Sea, Yellow Sea, Sea of Japan and Sea of Okhotsk; on the north it communicates with the Arctic Ocean by Bering's Strait, on the south it is bounded by the Antarctic Ocean, and on the east it joins the Atlantic at Cape Horn. Within this enormous circumference it includes the numerous islands composing the groups of Australasia and Polynesia and those adjoining America and Asia. The average depth of the Pacific appears to be greater than that of the Atlantic, and its bed is less irregular. The deepest soundings known are 5155 fathoms (30,930 feet), north of New Zealand, and 5269 fathoms (31,614 feet), off the island of Guam.

In the Pacific the tides never attain the maximum heights for which some parts of the Atlantic and Indian oceans are celebrated. The trade winds of the Pacific are not so regular in their limits as those of the Atlantic, and this irregularity extends over a much wider region in the case of the southeast trade wind than in the case of the northeast. The cause of this is the greater number of islands in the South Pacific Ocean, which, especially in the hot season, disturb the uniformity of atmospheric pressure by local condensations. The northeast trade wind remains the whole year through within the northern hemisphere. The southeast trade wind, on the other hand, advances beyond the equator (See TRADE WINDS). In the Chinese seas the terrible typhoon occasionally rages and may occur at any season of the year (See TYPHOON).

The Portuguese were the first Europeans who entered the Pacific. Balboa, in 1513, discovered it from the summit of the mountains which traverse the Isthmus of Darien. Magellan sailed across it from east to west in 1520–1521. Drake, Tasman, Bering, Anson, Byron, Bougainville, Cook, Vancouver, Lapérouse and others traversed it in different directions in the seventeenth and eighteenth centuries.

Pacific Railroads or **Transcontinental Railroads,** the name frequently applied to those lines of railway which extend westward from the Mississippi River to the Pacific coast. The first of these to be constructed was the Union Pacific, extending from Omaha to San Francisco, and completed in May, 1869. Other lines in the United States are the Northern Pacific, extending from Saint Paul and Duluth to Portland; the Great Northern, extending from Saint Paul and Duluth to Seattle and traversing a region north of that penetrated by the Northern Pacific; the Atchison, Topeka & Santa Fé, extending from Chicago to San

Francisco and passing through Kansas, Colorado, New Mexico and Arizona, and the Southern Pacific, sometimes known as the Sunset Route, extending from New Orleans to San Francisco. North of the United States the Canadian Pacific extends from Montreal to Vancouver, and the Grand Trunk Pacific is projected to extend westward through the northern part of Manitoba and across the central parts of Saskatchewan and Alberta, extending to Port Simpson, on the coast of British Columbia, while a branch extends in a northwest direction to Dawson, Yukon Territory. The Pacific railways in the United States were aided in their construction by the government, which gave extensive grants of public land along their lines, and, in the case of the Union Pacific, guaranteed the bonds. A number of other lines, such as the Chicago, Rock Island & Pacific and the Missouri Pacific, extend partially across the continent from Mississippi River points and then make connection with some of the through lines named above. See Railroads.

Packer, Asa (1806–1879), an American capitalist and philanthropist, born in Groton, Conn. He went to Pennsylvania, engaged in various canal and railroad enterprises, and became the richest man in the state. He was a member of the Pennsylvania legislature and served two terms in Congress. Lehigh University was liberally endowed by him.

Paddlefish, a large fish allied to the sturgeons, so named from the elongated, broad, paddle-shaped nose, with which it stirs up the soft, muddy bottom in search of food. It often reaches a length of from five to six feet. The paddlefishes are exclusively North American in their distribution, being found in the Mississippi, Ohio and other great rivers of that continent.

Paderewski, *pah de ref'ske,* Ignace Jan (1860–), a Polish pianist, born in Poland. He received his musical education at Warsaw and Berlin and was made professor of music in the Conservatory of Music in Warsaw, at the age of eighteen. At twenty-four he was made professor in the Conservatory of Strassburg. Later he studied in Vienna and began professional tours, upon all of which he aroused the greatest enthusiasm, being considered the foremost of modern pianists.

Pad'ua, a city of Italy, capital of a province of its own name, 22 mi. w. s. w. of Venice, with which it is connected by rail. It is situated on the Bacchiglione River, which flows through the city in several branches and is crossed by numerous bridges. The houses are lofty, the streets narrow and crooked; and several of them, as well as some of the squares, are lined with medieval arcades. Of recent times the town has been much improved by the opening up of new, and the widening of old, streets. The buildings most deserving of notice are the cathedral, which dates from the sixteenth century; the Palazzo della Ragione; the large, mosque-like Church of San Antonio; the municipal picture gallery; the episcopal palace, and many private palaces. The university was long renowned as the center of law and medicine in Italy and was one of the most famous of European universities. Its students number now less than fifteen hundred. The manufactures of Padua are not of great importance. They include farm machinery, automobiles, chemicals and distilled liquors. The city is an important trading center for cattle, wine, oil and grain.

Under the Romans Padua was a flourishing town, and its history is similar to that of most of the cities of Italy after the decline and fall of the Roman Empire. Latterly it was under the rule of Venice, whose fortunes it shared until 1866, when with Venice it became part of the kingdom of Italy. Livy was born at Padua. Population in 1901, 82,281.

Padu'cah, Ky., the county-seat of McCracken co., 80 mi. s. w. of Evansville, Ind., at the confluence of the Ohio and Tennessee rivers, on the Illinois Central and the Nashville, Chattanooga & Saint Louis railroads. The city is in an agricultural, lumbering and mining region and contains over fifty factories. The principal products are cotton rope, tobacco, veneering and other lumber products, wagons, pottery, flour and various other articles. It has railroad shops, and steamboats are also constructed. There are good shipping facilities, both by rail and water, and the city has a very extensive wholesale trade in tobacco, groceries, whisky, queensware, drugs and other goods. There are more than a score of churches, five banks, a business college, Saint Mary's Academy and four newspapers. The principal structures include a fine high school building, a large city hall, a Federal building, a county courthouse and a public library. The place was settled in 1827 and was chartered as a city in 1856. Population in 1900, 19,446.

Paez, *pah'ais,* José Antonio (1790–1873), one of the founders of South American independence, a native of Venezuela. He entered the patriot army in 1810, rose to be a general of division in 1819 and took a leading part in the Battle of Carabobo, which secured the independence of Colombia in 1821. At first he acted in concert with Bolivar, but in 1829 he placed himself at the head of the revolution which culminated in the independence of Venezuela, of which he was the first president. He served again as president from 1839 to 1843. In 1860 he was made minister to the United States, and in the following year he became dictator of Venezuela. The abuse of power by one of his ministers led to an insurrection, by which Paez was driven into exile. He died in New York.

Paganini, *pah ga ne′ne,* NICCOLO (1784–1840), a celebrated violinist, born at Geneva. His first engagement was in 1805 at Lucca, where he found a patroness in Princess Eliza, Bonaparte's sister. In 1813 he went to Milan and in 1828 he visited Vienna. From this period his fame was world-wide. He was undoubtedly the greatest master of violin technique that ever lived, besides being an artist in interpretations.

Page, DAVID PERKINS (1810–1848), an American educator, born at Epping, N. H. He spent his first years on a farm, during which time he was able occasionally to attend a district school. At sixteen he entered Hampton Academy and spent two years preparing for the work of a teacher. He began teaching in the country schools of New Hampshire and later was appointed associate principal of the Newberry High School, where he remained for twelve years. During this time he became noted for his lectures before teachers' associations and for his writings. He formed the acquaintance of Horace Mann, by whom he was held in the highest esteem. In 1844 Mr. Page was chosen principal of the state normal school established at Albany, N. Y., the first institution of its kind west of New England, and now known as the Albany Normal College. By his untiring energy, ability and influence, Mr. Page brought this school to a high degree of perfection during the four years that he was associated with it, and this in the face of strong political opposition. The labor necessary to secure this success so overtaxed his strength that he died suddenly. He is now best known through his work, *Theory and Practice of Teaching,* which was the first work of the kind produced in the United States, and is one of the best.

Page, THOMAS NELSON (1853–), an American novelist, born in Virginia. He was educated at Washington and Lee University and at the University of Virginia and practiced law in Richmond. Among his writings, the most of which treat sympathetically of life in the South, are *Marse Chan,* his first successful story, published later in a volume called *In Old Virginia*; *Two Little Confederates*; *Unc' Edinburg*; *Red Rock,* and *Gordon Keith.*

THOMAS NELSON PAGE

Paging Machine. See NUMBERING MACHINE.

Pago′da, the name given to Hindu and Buddhist temples. The temple proper is generally of pyramidal form, of a number of stories, with curved roof, and embellished with extraordinary splendor. Connected with it may be various other structures, open courts and a gateway, the whole forming architecturally an imposing group. In China the pagoda is not always connected with a temple, but is often a memorial building. Pagodas are numerous, not only in Hindustan, but also in Burmah, Siam and China.

Paine, ROBERT TREAT (1731–1814), an American lawyer, one of the signers of the Declaration of Independence, born in Boston, Mass. He was educated at Harvard University and studied for the ministry, but was admitted to the bar and was a delegate to the provincial and Continental congresses. After the Revolution he held the offices of attorney general of Massachusetts and associate justice of the state supreme court.

Paine, THOMAS (1737–1809), a political and deistical writer, born in England. In 1774 he emigrated to America, with a letter from Franklin, whom he had met in England. Paine threw himself heart and soul into the cause of the colonists, and his pamphlet entitled *Common Sense,* written to recommend the separation of the colonies from Great Britain, and his periodical called *The Crisis,* published during the Revolutionary War, gave him the right to be considered one of the founders of American independence. In 1787 he went to France, where he was well received, and then crossed to England. Here, too, he was given a cordial welcome by Burke and Fox and their party; but despite his friendship with Burke he wrote, in answer to Burke's *Reflections upon the Revolution in France,* the *Rights of Man,* in which he attacked Burke severely. A prosecution was commenced against him for his views on the English Constitution, expressed in the *Rights of Man,* but while the trial was pending he was chosen member of the French National Convention for the Department of Calais, and, making his escape, set off for France, where his *Rights of Man* had gained him great popularity. On the trial of Louis XVI he voted against the sentence of death, proposing his imprisonment during the war and his banishment afterward. This conduct offended the Jacobins, and toward the close of 1793 he was excluded from the Convention, arrested and committed to prison, where he lay for ten months, escaping the guillotine by an accident. Just before his confinement he had finished the first part of his work entitled the *Age of Reason,* which was published in London and Paris in 1794. By the publication of this work, he forfeited the favor of many of his American admirers. He remained in France till August, 1802, and then embarked for America, where he spent the remainder of his life, occupied with financial questions and mechanical inventions.

Painting, the art of representing objects in nature by means of color. Considered in relation to the subjects treated, painting may be divided into decorative; historical; portrait; *genre,* representing scenes of common or domestic life; landscape, with seascape; architectural, and still life, in the last of which are represented inanimate groups, such as vases or fruits. According to the methods employed in the practice of the art, it is termed oil, water color, fresco, tempera or distemper, and enamel painting. Decorative works, usually in fresco or tempera, but sometimes in oil, are generally executed upon the walls, ceilings or other parts of a building. Up to the fourteenth century ordinary paintings in both oil and tempera were generally made on wood panels, prepared with a coating of size and white, and these are still sparingly employed; but tightly stretched canvas, covered with a priming of size and white lead, is now almost universally adopted for oil painting. For water colors, paper alone is employed.

Oil colors are colors ground with oil, and *water colors* are those wherein gum and glycerine have been used. Both are ground solid, oil being used in the first case and water in the second to thin out the colors when on the palette. Fresco painting is executed on wet plaster. In tempera the colors are mixed with white; in encaustic, wax is the medium employed, and in enamel the colors are fired. Egyptian, Greek and early Roman paintings were executed in tempera; Byzantine art found its chief expression in mosaics, though tempera panels were executed, and early Christian art up to and partly including the fourteenth century adopted this last method. The substance employed in mixing the colors was a mixture of gum and white of egg, or the expressed juice of fig tree shoots. The introduction of oil painting was long attributed to the Van Eycks of Bruges (1380–1441), but painting in oil is known to have been practiced at a much earlier period, and it is now generally held that the invention of the Van Eycks was a drying substance with which to mix or thin their colors.

ANCIENT PERIOD. Painting first comes into historical notice in Egypt in the nineteenth century B. C., but the most flourishing period was between 1400 B. C. and 525 B. C. With the Egyptians the art was the offspring of religion and was, with sculpture, from which it cannot be separated, subordinate to architecture. The paintings are found chiefly on the walls of tombs and temples, but they are also on mummy cases and rolls of papyrus. They consist chiefly of the representation of public events, sacrificial observances and the affairs of everyday life. No attempt was made to imitate nature, and the work was executed according to strict rules, under the supervision of the priesthood. The paintings were usually not flat, but in low relief or slightly sunk. The artists showed no knowledge of perspective, but produced natural and lifelike pictures. The colors used are very simple, but the effect is often harmonious and beautiful.

In Greece, as in Egypt, painting, with sculpture, was subordinate to architecture, and the friezes, pediments and statues of the temples were originally colored.

Rome never had in ancient times an art that was its own or produced a painter worthy of note. The conquest of Greece by the Romans brought an influx of Greek artists into Italy, and it was by their hands that the principal works of Roman art were produced. A number of specimens of ancient paintings, chiefly in fresco and mosaic, have been discovered in the tombs and baths of Rome, at Pompeii and at other places in Italy. During the first three centuries after Christ, painting under the new influence of Christianity was practiced secretly in the catacombs (See CATACOMBS). But with the establishment of Christianity, by Constantine, as the religion of the state, Christian art was permitted to emerge and was allowed to adorn its own churches in its own way. Later there were many limitations and rigid requirements which fettered the artists, and the result was that art declined, until, with the flood of barbarism which in the seventh century buried Italian civilization, the art of Christian Rome was practically extinguished.

Meanwhile, with the establishment at Byzantium of the Roman capital, in 330 A. D., a Byzantine school of art had been steadily growing. At Byzantium, art had become Christian sooner and more entirely than at Rome. Like the art of ancient Egypt, however, it had grown, under the strict influence of the priesthood, mechanical and conventional, but was yet strong enough to send artists and teachers through southern Europe. All the Byzantine decorations are in mosaic and are noteworthy for the splendor of their gilded backgrounds and for their grandeur of conception, though the figure drawing is weak, with no attempt at pure beauty.

MEDIEVAL PERIOD. In Italy the painters could not at once free themselves from the Byzantine tradition which compelled one painter to follow in the steps of his predecessor without referring to nature; and so this style was carried on in Italy by Byzantine artists and their Italian imitators up to the middle of the thirteenth century. The breaking through of this tradition and the great progress made by the arts in the thirteenth century, form the beginning of a movement which has been termed the Renaissance or Revival (See RENAISSANCE). Three cities of Italy, namely, Siena, Pisa and Florence, share the honors of this revival, each boasting a school, and each possesses two or three great names. The most important of these painters who showed a marked departure from the Byzantine manner was Giovanni Cimabue, who may be said to be the father of modern painting. Cimabue was the first to give individual life, grace and movement to figures. He made the draperies less rigid and showed a naturalism which was entirely lacking before his time. The style of the Florentine school at this period was somewhat austere and severe, never sensuous. It was the most decorative of all Italian painting. The work of these schools has an earnestness, a devotion and a spiritual significance which will forever make the fourteenth century memorable in the history of art.

EARLY RENAISSANCE. With the fifteenth century came the introduction of oil painting, and with it an all-around improvement, both in knowledge and power of expression. The work of the Van Eycks, Hans Memling and others of the Netherlands shows an excellence in execution and a power of expression not always inferior to the Southern artists. Verrochio, the master of Leonardo da Vinci, promoted a knowledge of anatomy, and Ghirlandajo, the master of Michelangelo, may also be mentioned, both as goldsmith and painter. These painters and others belong to the *Florentine school*, the chief characteristic of which, at this period, was a vigorous naturalism. The *Venetian school* also arose at this time under the influence of Giovanni Bellini and his brother Gentile, whose works, though somewhat hard and somewhat dry in texture, yet in color anticipate the great works of their pupils. The *Umbrian school* is characterized by intense religious sentiment. Illustrative qualities and color are good, but the strength and vigor of the Florentine school is lacking. The Italian art work of the fifteenth century, by its unconscious and spiritual meaning, excelled much of that which was to follow.

SIXTEENTH CENTURY. The interest of the sixteenth century is centered as much upon particular men as upon schools. The four great schools in *Italy* were at Florence, Rome, Parma and Venice, and each furnished from its scholars a painter who was in himself the particular glory of his school. Heading the Florentine comes Leonardo da Vinci, celebrated as painter, sculptor, architect and engineer. Then followed Michelangelo, combining in himself the highest powers in architecture, sculpture and painting. He was followed in Florence by Fra Bartolommeo and Andrea del Sarto, the best colorist of the Florentine school. The Roman school, a continuation of the Umbrian, centers itself round the third great name, that of Raphael Santi, aptly called the prince of painters. Parma contains the work of Correggio, generally known as the head of the Lombard school, an artist unrivaled for grace and for harmony of light and shade. Lastly, Venice produced a school supreme in its use of color. Titian, chief of the Venetians, takes rank with the great masters of the Florentine and Roman schools.

In *Germany* the influence of the Flemish school had made itself felt and had produced in Albrecht Dürer of Nuremberg the most celebrated master of his time north of the Alps. Then followed Hans Holbein the younger, the greatest painter Germany ever had, who excelled in pictorial effects and in use of detail, as well as in general effect. In the *Netherlands* Lucas van Leyden stands as the most important painter of the early Dutch school.

SEVENTEENTH CENTURY. With the seventeenth century came the decline, brought about chiefly by the slavish imitation of the great painters of the preceding period. The art of Guido Reni, Albani and Domenichino, representatives of the Bolognese school, begun somewhat earlier by the Caracci, was excellent for its technical qualities, but it was entirely lacking in originality.

In *Flanders* Rubens became the greatest exponent of Italian art. His pictures are especially good for their strength and brilliant coloring. His chief pupil was Van Dyck, noted for his portraits. At this same time there arose also a noted class of *genre* painters, among whom was Teniers the younger. In *Holland* art had attained a distinct individuality in Franz Hals, and to a greater degree in Rembrandt, both portrait painters distinguished for their remarkable groups. Holland, too, is the great exponent of landscape painting, as shown in the work of such men as Van de Velde, Ruysdael and Cuyp, and of *genre* painting, in the naturalism of Gerard Dow and Van Ostade.

Painting in *Spain*, which stands alone in the prevailing religious ascetic character of its productions, reached its greatest epoch in this century, with the realism and religious fervor of Velasquez and Murillo.

Italian influence was very marked in *France* in the seventeenth century. Nicholas Poussin, figure and landscape painter, was one of the greatest painters France can claim. Claude Lorraine and Casper Poussin are painters of landscape, who, though born in France, yet worked in Italy and stand apart from the followers of the national style, which was coeval with the court of Louis XIV and representative of it, the chief exponents being Le Brun and Mignard.

EIGHTEENTH CENTURY. In *England* the first native painter of note was William Hogarth, who turned directly to nature in his art. He was followed by Sir Joshua Reynolds and by Gainsborough, distinctly original. A school of watercolorists arose at this time, among whom Turner stands preëminent.

NINETEENTH CENTURY. In *France*, David, a painter whose influence made itself felt throughout Europe, was the great reformer. He insisted upon a return to the study of the antique, and his followers number a few distinguished men, notably Gros and Guerin. Géricault, a pupil of Guerin, was the first to break with the extreme classicism of the school of David. Ingres, Delacroix and Delaroche, the last named noted for the reality of his historical subjects and for the tenderness and pathos of his sacred pictures, are the most distinguished names of the more direct and romantic style. Modern French landscape art, founded upon an impulse received from England, has had Decamps, Rousseau, Corot, Millet and Jules Breton as its chief exponents. The work of Regnault illustrates remarkably the tendencies of modern French painting. Bastien Lepage, with his literal renderings of nature, strongly influences the younger British school; and Meissonier, Gérôme, Bougereau, Constans and Puvis de Chavannes, a decorative artist, are some of the chief members of a school which is at the present time influencing the art of the world.

Germany during the eighteenth century remained stationary in matters of art, but with the revival in France came a similar but slightly later movement in Germany. The chief of the revivalists was Overbeck, and following him came his pupil Cornelius, one of the greatest of modern German painters, whose work is best seen in Munich. Schnorr von Carolsfeld chose for his subjects the medieval history and myths of Germany and also produced an extensive series of illustrations of the Bible. Lessing is famous, both for his historic and landscape pictures. Gabriel Max and Menzel, in historic painting; Knaus Vautier, Metzler and Bochmann, in *genre*, and Achenbach, in landscape, are worthy of note.

Among the best known later artists in *Great Britain* are John Constable, Rossetti, Burne-Jones, William Morris, Leighton, Watts, Millais, Landseer and Alma-Tadema. In *Russia* painting remained at a standstill long after the Byzantine period, but since 1850 it has made great advances. It has produced Swedomsky, historical painter; Verestchagin, a traveler artist, and Kramsköe, a religious painter.

Until about 1825 the *United States* had followed Great Britain in art, as in literature. Since that time, however, a marked development of individuality and excellence has been apparent. At the French exhibition, the most famous and exclusive of art exhibitions, there was in 1855 no American section; in 1868 a part of a small section was allotted to the United States; in 1878 it had a large exhibit, and in 1900 it furnished the largest exhibit except France and received more honors than any other nation except France. Most American painters complete their education abroad, usually in France; but there are an increasing number of good art schools in the United States, and with the excellent instruction offered in the public schools, they are rapidly cultivating an appreciation of the best in art. Of American painters the following are probably the best known: West, Copley, Stuart, Allston, Bierstadt, Church, Inness, La Farge, Sargent, Vedder, Whistler and Moran. A more comprehensive knowledge of painting may be obtained by reading the biographical articles on the different painters.

Paintings, TWELVE GREAT. The artist-critic W. W. Story has given the following as the twelve greatest paintings in the world: The *Transfiguration,* Raphael, 1519, in the Vatican; *Sistine Madonna,* Raphael, 1518, Dresden Gallery (See RAPHAEL); *Last Judgment,* Michelangelo, 1534–1541, Sistine Chapel; *Communion of Saint Jerome,* Domenichino, 1614, Vatican; *Descent from the Cross,* Rubens, 1612, Antwerp Cathedral; *Descent from the Cross,* Volterra, about 1545, Church of S. S. Trinita de' Monti, Rome; *Last Supper,* Da Vinci, 1498, Santa Maria delle Grazie, Milan (See VINCI, LEONARDO DA); *Assumption of the Virgin,* Titian, 1518, Venetian Academy; *The Night,* Correggio, 1522, Dresden Gallery; *Aurora,* Guido Reni, 1609, Rospigliosi Palace, Rome; *Beatrice Cenci,* Guido Reni, 1509, Barberini Palace; *Immaculate Conception,* Murillo, 1678, Louvre.

Paints, compounds of a coloring substance, mixed with oil, glue or water. The coloring substance is called a *pigment,* and the liquid with which it is mixed, a *vehicle.* To the mixture of pigment and vehicle there is usually added a *drier,* for hardening the painted surface, and a *solvent,* or *thinner.* Turpentine is the best thinner. The greater number of pigments are minerals, but some, like cochineal, are animal substance, and others, like indigo, are of vegetable origin. In oil paints the pigments are mixed with oil, usually that obtained from flaxseed, and in water colors the pigments are mixed with water. For ordinary house paints, especially for external use, white lead and boiled linseed oil are generally used. The boiling causes the oil to dry quickly when exposed to the air and also protects the pigments from water.

Paisley, *payz'ly,* a municipal and Parliamentary borough of Scotland, in the County of Renfrew, on the White Cart, 7 mi. w. s. w. of Glasgow. The most noteworthy building is the abbey church, and other buildings of interest are the townhall, the new county building and the Coats Memorial Baptist Church, one of the finest modern buildings in Scotland. Paisley has long been noted for its manufacture of textiles. The shawl manufacture, introduced about the beginning of the nineteenth century and long the most flourishing industry of the town, is now almost extinct, but the textile manufacture is still large. Other manufactures include soap, starch, looms, chemicals and distilled liquors. There are also extensive dyeing, engineering and tanning works. Population in 1901, 79,350.

Pak'enham, EDWARD MICHAEL, Sir (1778–1815), an English soldier, born in Ireland. He entered the army and became major general in 1812. He served in the Peninsular War under the Duke of Wellington, winning distinction for his gallantry and success as a leader, and he commanded the British expedition against New Orleans in 1814. He was killed in the battle of January 8, 1815. See NEW ORLEANS, BATTLE OF.

Palais Royal, *pa lay' rwah yahl',* (French, "royal palace"), a popular resort of the Parisians, originally a royal palace, as the name implies. The palace was built by Richelieu and by him it was presented to Louis XIII. It was confiscated by the Republicans in 1793, and the Tribunal sat in the palace during the Reign of Terror. At the Restoration it was repurchased by the duke of Orleans, but in the revolution of 1848 it was sacked by the mob and again appropriated to the State. In 1871 it was set on fire by the Communists, but it has since been restored. The Théâtre Français and several shops now form parts of the buildings of the Palais Royal.

Palanquin, *pal an keen',* or **Palankeen,** a covered conveyance, used in India, China and other countries of the East. It is a sort of box, about 8 feet long, 4 feet wide and 4 feet high, with wooden shutters of lattice work. It is borne by poles on the shoulders of men and can carry one person, who sits upon a seat. The palanquin is not now extensively used, because in India and other countries where it was formerly employed by Europeans, the building of railways and the improvement of roads have made other means of conveyance more practicable and desirable.

Pal′ate, the name applied to the roof of the mouth. It consists of two portions, the *hard* palate in front, the *soft* palate behind. The former is bounded above by the palatal bones, is lined by mucous membrane and is continuous behind with the soft palate. It supports the tongue in eating, speaking and swallowing. The soft palate is a movable fold, suspended from the border of the hard palate in the back of the mouth. It consists of mucous membranes, nerves and muscles and forms a sort of partition between the mouth and the openings from the nostrils. Its lower border is free and from the middle of it hangs the *uvula*; on each side are two curved folds of mucous membrane, called the *arches*, or *pillars*, of the soft palate. Between these on each side of the pharynx are the two glandular bodies known as *tonsils*. The soft palate comes into action in swallowing and is of great importance in the utterance of certain sounds. The special use of the uvula is not well known. It is often relaxed or enlarged, causing a troublesome cough. Glands, secreting the mucus which lubricates the throat during the passage of food, are abundant in the soft palate. See TONSILS.

Palat′inate (German, *Pfalz*), a division of the old German Empire, consisting of two separate parts, distinguished as the Upper Palatinate and the Lower, or Rhenish, Palatinate. The former was bounded mainly by Bohemia and Bavaria, and its capital was Amberg. The Lower Palatinate, or Palatinate proper, lay on both sides of the Rhine and included the towns of Heidelberg and Mannheim. The counts Palatine were in possession of the Palatinate and the districts belonging to it as early as the eleventh century, and they were long among the most powerful princes of the German Empire. By the Peace of Westphalia in 1648 the Lower Palatinate was separated from the Upper, Bavaria receiving the latter, while the former became a separate electorate of the Empire and was henceforth generally known as The Palatinate. By the treaties of Paris, 1814 and 1815, the Palatinate was split up; Bavaria received the largest part, and the remainder was divided between Hesse-Darmstadt, Baden and Prussia. The name Palatinate now belongs to the detached portion of Bavaria on the west of the Rhine, while the Upper Palatinate forms another portion of Bavaria.

Palau, *pa low′*, **Islands.** See PELEW ISLANDS.

Palawan, *pa lah′wan,* or **Paragua,** *pa rah′gwa,* one of the Philippine Islands. See PHILIPPINE ISLANDS.

Palenque, *pa lain′ka,* a village of Mexico, in the State of Chiapas, 78 mi. n. n. e. of San Cristóbal. About 7 miles to the southwest of the village are some of the most extensive and magnificent ruins in America, belonging to the period before the Spanish conquest. The principal of these, called the Palace, is 220 feet long by 180 feet wide and has numerous sculptures and hieroglyphics.

Pal′eontol′ogy, the science which treats of life that existed upon the earth before the age of man. Paleontology includes the study of fossils of both plants and animals. It is closely related to anatomy, botany and geology, and is one of the sciences upon which comparative anatomy is founded. The study of fossils according to the principles of paleontology is comparative, and it has enabled geologists to determine the relative advantages of the different rock formations and to divide geologic time into the periods and systems as they are now generally accepted. See GEOLOGY; FOSSIL.

Pa′leozo′ic Era, that division of geologic time extending from the Protozoic to the Mesozoic Era and including the Cambrian, Ordovician, Silurian, Devonian and Carboniferous periods, each of which is described under its title. The time covered by the Paleozoic Era was exceedingly long, as shown by the great thickness of the combined rock formations and the development of life from the protozoa to the vertebrates. See GEOLOGY; MESOZOIC ERA, and articles on the periods and systems named above.

Paler′mo, a seaport, the capital of Sicily, on the north side of the island, on the Bay of Palermo. The city is ornamented with numerous fountains and has many notable buildings, among which are a cathedral of the twelfth century, the churches of San Salvatore, San Domenico and San Giovanni degli Eremiti, a royal palace, the picture gallery, the armory, the archiepiscopal palace, the customhouse and the theaters. The city is the seat of a university which has about 1400 students. It is the residence of the military commandant of the island and has an arsenal and shipbuilding yards. The manufactures consist chiefly of gloves, leather and glass, and the principal exports are sumach, wine and spirits, fruits, sulphur, oil, essences, cream of tartar and licorice. Among the articles of import are woolen, cotton and silk tissues, coffee, sugar, coal and porcelain. The fisheries are very productive and employ thousands of men.

Palermo was probably founded by the Phoenicians, and it afterwards became the capital of the Carthaginian possessions in Sicily. It was taken by the Romans in 254 B. C. The Saracens held it for a time, and in 1072 it fell to the Normans. The German emperors and the French subsequently held it, and from the time of the Sicilian Vespers it shared the fortunes of the Sicilian kingdom. Garibaldi captured the town in 1860. Population in 1901, 309,694.

Pal′estine or **The Holy Land,** a maritime country of Asiatic Turkey, in the southwest of Syria. Its length from north to south is about 150 mi.; its breadth, from 35 to 110 mi., and its area, nearly 10,000 sq. mi., or about the same as that of New Hampshire. The coast has no indentations, except the Bay of Acre in the north. The chief feature of the interior is the deep valley through which flows the Jordan, a river which intersects the country from north to south and connects three lakes—the Dead Sea, the Sea of Galilee and Lake Merom (See DEAD SEA). The surface of the country is generally mountainous, and the most remarkable peaks are Carmel, Jebel, Ebal, Gerizim, Zion, Moriah and the Mount of Olives. The maritime or coast plains of Sharon and Philistia, the river plain of Jordan and the plain of Esdraelon in the north, are the plains worthy of mention. The principal river is the Jordan. This river has a length of 200 miles, including windings, but its direct course is only about 70 miles. Its course from Merom to the Dead Sea is mostly below the sea level. The chief tributary of the Jordan is the Jabbok. The country is, on the whole, not well watered, as the river valleys, which are numerous, are dry for the greater part of the year.

The year in Palestine may be divided into two seasons, summer and winter. During the former, which lasts from April to November, little or no rain falls; during the latter there is a considerable fall of rain, but the average annual rainfall is only about 20 inches. In the Jordan Valley and along the Mediterranean lowlands the summer heat is apt to be oppressive, on account of the extreme humidity of the atmosphere. During the winter the ground is seldom, if ever, frozen, except in the higher elevations.

The flora of Palestine is rich in flowering plants, including the scarlet anemone, the ranunculus, the narcissus, the crocus and the pheasant's eye. The country is now, as a whole, bare and desolate, though forests of pine and oak exist. The most common tree is the oak, including the prickly evergreen oak. Other trees are the olive, the palm, the oleander, the sycamore, the walnut, the ash and the cedar. The wild animals once included the leopard, the hyena, the bear, the wolf and the boar, but these have all disappeared. The domestic animals of burden are the ass, the mule and the camel. Cattle are not very numerous, but sheep and goats are abundant. Fish abound in the Sea of Galilee and in the Jordan. Agriculture is in a backward state, but cereals, grapes, figs, olives, oranges and apricots are produced. With irrigation and careful cultivation, large crops might be procured.

The ancient name of Palestine was Canaan, and when thus named, in the time of the patriarchs, the country was parceled out among a number of independent tribes, all probably Semitic. About the middle of the eleventh century B. C. these tribes were united under a king, Saul, and under his successors, David and Solomon, the kingdom remained united. In the tenth century a division occurred, the kingdoms of Israel, in the north, and Judah, in the south, taking the place of the early united kingdom. The kingdom of Israel was overthrown in 722 B. C. by Assyria; the kingdom of Judah in 586 B. C., by the Babylonians (See JEWS). In the time of Christ, Palestine was held by the Romans and was divided into the four provinces of Galilee, Samaria, Judea and Peraea. In the seventh century A. D. it was taken by the Saracens, under Omar. The severities exercised toward Christians gave rise to the Crusades, but Mohammedanism prevailed. The sultan of Egypt ruled the country till 1517, when it was incorporated with the Turkish Empire.

It is only within a comparatively recent period that the exploration of Palestine has been carried out systematically and with some attempt at thoroughness, though much yet remains to be done. The most valuable results have been those achieved under the direction of the Palestine Exploration Fund, a society organized in 1865 for the purpose of making an exhaustive exploration and an exact survey of the Holy Land. A large and detailed map of the country has been published and an immense mass of valuable information regarding topography, natural history, manners and customs has been accumulated. The present population of the country is estimated at 650,000.

Palestine, TEXAS, the county-seat of Anderson co., 100 mi. s. e. of Dallas, on the International & Great Northern railroad. The city is in an agricultural and fruit-growing country, near salt mines and deposits of iron ore. It contains railroad offices and shops, cotton factories and packing houses and has a considerable trade in cotton, grain, fruit and vegetables. There are two libraries, a Y. M. C. A. building, a fine city hall and an opera house. The place was settled in 1846 and was incorporated in 1870. Population in 1900, 8297.

Palestrina, *pah les tree′na,* GIOVANNI PIERLUIGI DA (1524–1594), a celebrated Italian musician, one of the greatest musical geniuses in the world's history. He did much to start music upon the path of modern progress. His works consist chiefly of sacred music, the most important being *Stabat Mater.*

Pal′frey, JOHN GORHAM (1796–1881), an American historian and clergyman. After his graduation from Harvard he studied theology, and in 1818 he became the minister of a Congregational-Unitarian church in Boston. From 1831 to 1839 he was professor of sacred literature at the Harvard Divinity School. He took an active interest in politics, was a member of the Massachusetts house of representatives, secretary of the commonwealth and a member of Congress. Among his writings are *The Evidences of Christianity, The Relation Between Judaism and Christianity,* and a *History of New England During the Stuart Dynasty,* this last his greatest work. From 1835 to 1843 he was editor of the *North American Review.*

Palgrave, *pawl′grave,* FRANCIS, Sir, (1788–1861), an English historian, whose best work is the *Rise and Progress of the English Commonwealth.* His other writings include a *History of England,* a *History of Normandy and England* and a number of works edited for the Record Commission. From 1838 until his death he was deputy keeper of the records.

Pâli, *pah′le,* the sacred language of the Buddhists, as closely related to Sanskrit as Italian is to Latin. It is the language in which the oldest religious, philosophical and historical literature of Buddhism is written, and it is especially the language of the sacred books of the Buddhists of Ceylon, Burmah and Siam; but it is no longer spoken anywhere, though a corrupt form of it is to some extent used for literary purposes.

Pal′impsest, a manuscript prepared by erasure for being written on again, especially a parchment so prepared by washing or scraping. This custom was brought about by the costliness of writing materials, and was practiced extensively in the monasteries, especially from the seventh century to the thirteenth. That which replaced the ancient manuscripts was nearly always some writing of an ecclesiastical character. The parchments which have been scraped are of course indecipherable, but those which have been washed have often been revived by chemical processes. Fragments of the *Iliad* and extensive portions of many Greek and Roman manuscripts have been recovered by these means.

Palisades, *pal y saydz′,* the name given to a cliff of nearly perpendicular rock, which extends along the western bank of the Hudson River from Haverstraw, N. Y., to Weehawken, N. J. The Palisades are about 30 miles in length and range in height from 200 to 500 feet. They rise abruptly from the water and add much to the scenery of this part of the Hudson. In places there are large accumulations of talus at the foot of the rock. The formation is of a volcanic rock, generally known as diabase. See HUDSON RIVER.

Palissy, *pa le′se,* BERNARD (1510–1590), a French artist and philosopher, best known as the inventor of a process for making beautifully colored pottery. After many years of study and hard work, passed in utmost privation, he was restored to fortune by the discovery of a method which enabled him to produce a most artistic ware. He obtained a pure white enamel, affording a perfect ground for the application of decorative art. On this ground he represented with consummate skill natural objects grouped and portrayed, and his enameled pottery and sculptures in clay became recognized as works of art. In 1562 he established himself at Paris, where he continued to work at his art and also delivered scientific lectures, which were attended by the most distinguished men in Paris. He suffered persecution as a Huguenot and was arrested in 1589 and thrown into the Bastille, where he is said to have died.

Palladio, *pal lah'de o,* Andrea (1518–1580), one of the greatest classical architects of modern Italy, born at Vicenza. At Rome he made a thorough study of ancient monuments, and on his return to Vicenza he established his fame by his designs for many noble buildings, among which was his first great work, the magnificent two-storied arcade around the Basilica of Vicenza. He was the author of a *Treatise on Architecture.*

Palla'dium, a white metal with a bright luster, discovered by Wollaston in 1803 and found in small quantity associated with native gold and platinum. It presents a great general resemblance to platinum, but it is harder, lighter and more easily oxidized. On account of its hardness, lightness and resistance to tarnish, it is useful in the construction of philosophical instruments.

Palladium, originally, a statue of any protecting deity of a city. The term is particularly applied, however, to a statue of Minerva, said to have fallen from heaven, which was preserved in Troy. The belief of the Trojans was that as long as the palladium remained in the city they could not be conquered. Diomedes and Ulysses succeeded in carrying it off, and many legends are told as to its fate. The Romans professed to believe that it had been brought by Aeneas to Italy, but several Greek cities also claimed it.

Pal'las Athe'ne. See Minerva.

Palma, *pahl'ma,* a city of Spain, capital of the island of Majorca, on the bay of Palma, 130 mi. s. by e. of Barcelona. It is built in amphitheater form and is walled and fortified. The principal buildings are the cathedral, the exchange, the governor's palace and the townhall. There are schools of medicine and surgery, normal and art schools, two public libraries and a museum of painting. The city has manufactures of alcohol, liquors, chocolate, starch, soap, flour, leather, sugar and glass, and possesses also shipbuilding yards of some importance. The city is the port of the whole island and has a large trade. Population in 1900, 63,937.

Palma, Tomas Estrada (about 1836–1908), a Cuban general and patriot, first president of Cuba. He became an ardent advocate of Cuban independence, joined the revolution of 1868 and was elected president of the new republic, but was captured and taken to Spain. After his release he founded a school in Orange County, New York, which he continued to manage until 1895. In 1895 he was chosen as the foreign representative of the Cubans and went to live in New York. In December, 1901, he was elected president of the Cuban Republic by an almost unanimous vote. He was reëlected in 1905, but the charge of fraud was immediately made, and an insurrection of considerable magnitude broke out. In September, 1906, affairs had come to such a crisis that the United States government intervened; Palma resigned and a provisional government was set up, under United States representatives.

TOMAS ESTRADA PALMA

Palmer, *pahm'ur,* Mass., a town in Hampden co., 15 mi. e. of Springfield, on the Chicopee River and on the Central Vermont and the Boston & Albany railroads. It contains manufactures of cotton and woolen goods, carpets, hats, wire and other articles. There are two libraries, a high school, a national bank and a savings bank. The place was settled in 1716 and was incorporated in 1775. Population in 1905, including several villages, 7755.

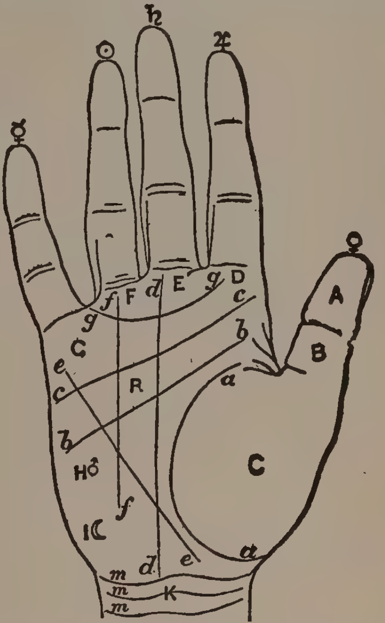
Palmer, Alice Freeman (1855–1902), an American educator, born at Colesville, N. Y., and educated at the University of Michigan. She taught a year in Wisconsin and was then for two years principal of the high school in East Saginaw, Mich., when she became professor of history at Wellesley College. Three years later she was appointed president and served in that capacity for five years, during which time the standard of scholarship was raised, the number of students greatly increased and several new buildings were added. She resigned upon her marriage to G. H. Palmer, a professor at Harvard. Later she served for three years as non-resident dean of women at the University of Chicago. She was much interested in educational and reform associations, lectured often along educational and municipal lines and was for some time a member of the Massachusetts State Board of Education. She was honored with the degrees of Ph.D. from the University of Michigan, L.H.D. from Columbia and LL.D. from Union University.

Palmer, John McAuley (1817–1900), an American political leader and soldier, born in Scott County, Kentucky. He was admitted to the bar of Illinois in 1839 and served in the state senate as a Democrat, but in 1860 he was a member of the electoral college as a Republican. He took an active part in the Civil War and became major general of volunteers, having served at New Madrid, Island No. 10, Murfreesboro, Chickamauga, Chattanooga and in the Atlanta campaign. He was governor of Illinois from 1869 to 1873 as a Republican, but in the latter year he returned to the Democratic party. He was elected United States senator from Illinois in 1891. In 1896 he became presidential candidate of the "Gold Democrats," or the National Democratic party.

Palmerston, *pahm'ur stun,* Henry John Temple, Viscount (1784–1865), an English statesman, educated at Harrow, at the University of Edinburgh and at Cambridge. He was returned to Parliament for Newtown in 1807, and in 1811 he was made a member for Cambridge University, which he represented for twenty years. From 1809 to 1828 he was secretary of war, and many reforms were introduced into the department during his term of office. A change in his attitude toward the reform question led to his withdrawal in 1828 from the Tory party, and two years later he became secretary for foreign affairs under the Whigs. His policy while in this office was marked by a friendly attitude toward France, with whose help England secured the independence of Belgium. Becoming secretary of foreign affairs in 1846, he held office until, in 1851, he was dismissed for having approved openly the policy of Napoleon III. Made prime minister in 1855, he prosecuted vigorously the Crimean War, and although his management of the war brought about his defeat in 1857 he was two years later again made prime minister. One of the most marked characteristics of his later policy was his favorable attitude toward Italian union.

Palmet'to, a common name of several species of palms, especially the cabbage palm, which grows in the West Indies and in the southern parts of the United States. It attains the height of 40 or 50 feet and is crowned with large leaves. It produces useful timber, and the leaves are made into hats, mats and other useful articles.

Pal'mistry or **Chiromancy** is the art of "reading the palm"—the art which professes to discover the temperament and character of any one, as well as the past and future events of his life, from an examination of the *palm* of his hand and of the lines traced upon it. As an art, palmistry appears to be of great antiquity. It has an ancient literature of its own in India and was to some extent, at least, known to the ancient Greeks.



PALMISTRY

A, will; *B*, logic; *C*, mount of Venus; *D*, mount of Jupiter; *E*, mount of Saturn; *F*, mount of Apollo; *G*, mount of Mercury; *H*, mount of Mars; *I*, mount of the Moon; *K*, the rascette; *a*, *a*, line of life; *b*, *b*, line of head; *c*, *c*, line of heart; *d*, *d*, line of Saturn, or fate; *e*, *e*, line of liver, or health; *f*, *f*, line of Apollo, or fortune; *g*, *g*, the girdle of Venus; *R*, the quadrangle; *m*, *m*, *m*, the bracelets of life.

Of the cultivation of palmistry among the Romans there is little evidence; but in the second century Artemidorus of Ephesus, the author of a work on the interpretation of dreams, is said to have devoted a whole treatise to the subject, which, however, is not extant.

The writers of the Middle Ages made frequent reference to the subject, and an important work was printed at Augsburg in 1475 by Johann Hartlieb. In the sixteenth century there were several treatises on the subject; in the end of the eighteenth century a celebrated palmist foretold the downfall of Napoleon; in recent times two Frenchmen, D'Arpentigny and Desbarrolles, have become the leading authorities, and it is on their works that modern English books on the subject are chiefly founded. The observation of the fingers and joints of the hand is quite as important to the chiromant as that of the palm itself. The thumb is generally regarded as the most important part of the hand. The first, or upper, phalanx of the thumb, when well developed, shows the presence of will and decision of character; the second, according to its development, indicates more or less logical power (See accompanying diagram for explanations through the remainder of the article). In studying palmistry the *mounts* of the hand, with the marks on them, and the lines in the palm are considered. The mounts are the elevations at the base of the fingers and thumb and in the side of the palm which extends from the root of the little finger to the wrist. The mounts are seven in number and are named from the planets, by the signs of which they are also known, namely, ♀ for Venus, ♃ for Jupiter, ♄ for Saturn, ☉ Apollo, ☿ Mercury, ♂ Mars, ☾ the Moon. When well developed, the mounts indicate the possession of the quality associated with the respective planets—for instance, Jupiter denotes pride and ambition; Saturn, fatality; Apollo, art or riches; Mercury, science or wit; Mars, courage or cruelty; Venus, love and melody; the Moon, folly or imagination. But the effect of a greatly developed mount may be modified by the lines in the palm or by other signs.

There are four principal lines—namely, the line of life, which surrounds the thumb, and which, if long, indicates a long life; the line of head, the line of heart, and the rascette, or the bracelets. The bracelets if well marked strengthen the effect of the line of life, each bracelet indicating thirty years of life. The line of heart, if long, clear cut and well colored, denotes an affectionate and devoted character; and the nearer the line stretches to Jupiter the better the character. If the line end in a fork, so much the better. In actors and mimics this line ascends the mount of Mercury. A good line of head—that is, a clear-cut, long, unbroken line—indicates the presence of superior intellectual qualities. If the line stretch to the mount of the Moon, it indicates imagination. A winding headline shows folly and indecision of character; a linked line (like a chain) denotes want of concentration. The other lines (which are not present in all hands) are the line of Saturn, or fate; the line of Apollo; the line of liver, or health, and the line of Venus. A long, clear-cut line of Saturn foretells a happy and prosperous life, while breaks or windings in the line foretell misfortunes or obstacles; a good line of Apollo shows that its owner will be successful in art; a good liver-line promises a long and healthy life; the Venus line, when present, indicates a character very liable to be influenced by the passion of love. Such marks on the mounts or lines as stars and crosses have their respective significations. A good open space between the lines of head and heart (the quadrangle) indicates a generous and noble disposition, while a very narrow space in the quadrangle is a sign of avarice and egotism.

Palm, *pahm,* **Oil,** a fatty substance obtained from several species of palms, but chiefly from the fruit of the oil palm, a native of the west coast of Africa. This tree grows to the height of 30 feet, bears a tuft of large pinnate leaves and has a thick stem, covered with the stumps of the dead leaves. The fruits, which are borne in dense clusters, are about 1½ inches long by 1 inch in diameter, and the oil is obtained from their fleshy covering. In cold countries it acquires the consistence of butter and is of an orange-yellow color. It is employed in the manufacture of soap and candles and for lubricating machinery. By the natives of the Gold Coast this oil is used as butter, and when eaten fresh it is a wholesome and delicate article of diet.

Palms, a great group of trees, of which there are about 1200 different species, confined almost exclusively to the tropics, though a few species are to be found in temperate zones. Palms are among the most interesting plants in the vegetable kingdom, because of their beauty, variety and great value to mankind. Some are vines, as slender as a reed, and reach several hundred feet in length; others have stems three and even five feet thick. Some are of low growth; others tower nearly 200 feet above the ground. The leaves of palms are of two kinds—the pinnate, or fern-shaped, such as the date and the cocoanut palm; and the palmate, or fan-shaped, examples of which are the common fan palm and the palmetto. The flowers grow in enormous clusters, usually hanging from the rosette of leaves which crowns the summit of the stem. The flowers are enclosed in heavy bracts, some of which are wood-like in texture and open with an explosion, to release the flowers. Humboldt estimated that on a single palm which he saw there were 600,000 flowers. Notwithstanding the small blossoms, some of the fruits are very large, as in the case of the cocoanut. Other species bear small berries, and still others have hard, bony nuts. Taken as a whole, it is thought probable that no family excepting the grasses is of so much benefit to mankind as the palms. Almost everything in the way of food, clothing, shelter or defense is furnished by one species or another to the simple inhabitants of the tropics, and the exportations to all parts of the world are enormous. See CABBAGE PALM; COCOANUT; DATE; DOUM PALM; IVORY PALM; PALMETTO; PALMYRA PALM; SAGO; TALIPOT PALM, and other titles.

FAN PALM

Palm Sunday, the last Sunday in Lent, the Sunday which precedes Easter. It receives its name because it is observed in commemoration of Christ's entry into Jerusalem. In Roman Catholic churches palm branches, which have been blessed by the priests, are carried home and preserved, to be used in celebration of Ash Wednesday.

Palmy'ra, an ancient city of Syria, now in ruins, situated in an oasis in the Syrian desert, 120 mi. n. e. of Damascus. It was, according to tradition, founded or enlarged by Solomon and was identified with the Greek Tadmor. The Romans destroyed the city, but it was rebuilt, only to be again destroyed by the Saracens. A second time rebuilt, it was completely overthrown by Tamerlane. There are remains of ancient buildings, the most important of which is the Temple of Baal. Zenobia was the most famous ruler of Palmyra. See ZENOBIA.

Palmyra Palm, the common Indian palm, which is the chief support of millions of people. Its fruit is a valuable food; its timber is excellent, and it furnishes thatch, cordage, materials for hats, fans, umbrellas and similar articles; sugar and arrack are made from it, and its leaves are used for writing tablets; the young shoots are boiled and eaten; the seeds are edible, and the fruit yields a useful oil.

Palo Alto, *pah'lo ahl'to,* BATTLE OF, the first important battle of the Mexican War, fought May 8, 1846, at the village of Palo Alto, 8 miles northeast of Brownsville, Tex. The American force of about 2300 was commanded by General Taylor, while the Mexican force numbered 6000 and was commanded by General Arista. The Americans were victorious after an all-day's contest, chiefly with the artillery. Arista retreated to Resaca de la Palma, where he was again defeated a few days later. See MEXICAN WAR.

Palpita'tion, a word used to describe certain abnormal beatings of the heart, in which the person feels the motion and is caused unpleasant and even painful sensations. The palpitation may be continuous, but it usually appears at irregular intervals after any mental or physical excitement; it sometimes appears suddenly, even in sleep. Palpitation may arise from some organic disease of the heart, but more frequently it occurs as the result of other disorders or from protracted emotion. The excessive use of coffee, tobacco or other stimulants may cause it, and a flatulent or overloaded stomach may produce it by pressure. The treatment of palpitation varies with the cause.

Pamir, *pa meer',* an elevated region of central Asia, which may be regarded as formed by the meeting of the Himalayan, Tian Shan and Hindu Kush mountains. It forms a plateau, with a general elevation of more than 13,000 feet, crowned by still loftier ridges and snow-topped summits. There are several small lakes, and the sources of the Oxus are found in the Pamir. The atmosphere is exceedingly dry, the extremes of heat and cold are very great, and a large part of the surface is barren. The inhabitants, however, find sufficient pasture for their cattle, and in favored localities there is a little cultivation. The "roof of the world," as the Pamir is called, is celebrated throughout central Asia, and trade routes have passed across it for ages.

Pam'lico Sound, a shallow lagoon on the southeastern coast of North Carolina. It is about 80 miles long, from 8 to 25 miles wide, and is separated from the ocean by long, narrow, sandy islands. It is connected with Albemarle Sound by the Croatan Sound.

Pampas, *pahm′paz,* a name given to the vast treeless plains of South America, in the Argentine Republic, Paraguay and Uruguay. The pampas are generally covered with grass and other herbage, and in many parts there are gigantic thistles, but with the heat of summer the vegetation is much burned. Shallow lakes or swamps occur in some parts, and parts have the character of a salt steppe. The pampas are roamed over by various tribes of indians, as well as by herds of wild horses and cattle. In many parts there are now cattle ranches, and large flocks of sheep are also reared. Where there is sufficient rainfall, the soil is well suited to agriculture. See PLAIN.

Pamphlet, *pamf′let,* in its ordinary sense, a booklet consisting of several leaves, stitched together, but not bound. Usually the term is restricted to writings that deal with current events and are more or less controversial in their character. In England, from the time of Henry VII to the early nineteenth century, pamphlets played a great part in all controversies, whether political or religious. The struggle between Protestantism and Catholicism brought forward numerous pamphleteers, who set forth their views in writings that were often virulent. During the course of the civil war in England, thousands of pamphlets appeared, dealing with the subject from all points of view. One man alone, William Prynne, wrote almost two hundred pamphlets. It was, however, during the reign of Anne that pamphlets had the greatest influence on the course of history. The most eminent of all English pamphleteers were Defoe and Swift, the latter the greatest pamphlet writer in English literature. Gradually, as newspapers and magazines became common, the need for pamphlets disappeared, although until the late nineteenth century many English political leaders made use of them.

Pan, a rural divinity of ancient Greece, the god of flocks and herds, originally represented as an old man with two horns, pointed ears, a goat's beard and a goat's tail. Later art made him a young man, differing from others only in his two short horns. The worship of Pan was well established, particularly in Arcadia. Pan invented the syrinx, or *pandean* pipes.

Pa′na, ILL., a city in Christian co., 40 mi. s. e. of Springfield, on the Illinois Central, the Baltimore & Ohio Southwestern and other railroads. Coal mining is the principal occupation, and there is a considerable trade with the surrounding agricultural region. The city has a public library and two banks, and it owns the waterworks. It was settled in 1853 and was incorporated in 1867. Population in 1900, 5530.

Panama, *pah na mah′,* the capital of the Republic of Panama, situated on the south coast of the isthmus, on a bay of the same name. It has a fairly good harbor, which is protected by islands. The city is not well built or well drained, and the inhabitants suffer considerably from fever and malaria. It is the Pacific terminus of the Panama railway and is an important port for the transshipment of goods which pass from the Pacific to the Atlantic and the Atlantic to the Pacific. Population, about 30,000.

Panama, ISTHMUS OF, the strip of land which connects North and South America. Its general direction is east and west, and in its narrowest part it is about 40 miles wide. It is also called the Isthmus of Darien. See PANAMA, REPUBLIC OF; PANAMA CANAL.

Panama, REPUBLIC OF, an independent state of South America, whose territory is coextensive with that of the Isthmus of Panama. Its length is about 350 mi., its breadth varies from 40 to about 100 mi., and its area is about 31,570 sq. mi. This is the narrow neck of land that is traversed by the Panama Railway and across which the Panama Canal is now under process of construction. The surface is generally uneven and rocky. The Pacific coast is high and broken, but that along the Caribbean is low and more even. The country has a tropical climate and a heavy rainfall. The region is generally unhealthful to all except natives. The population is made up of mixed races of Spanish, indian and negro origin and includes but few white men. A few of the native tribes still remain, and in the western portion of the country they have maintained their original organizations and language. The leading industries are grazing and agriculture, and on the Pacific coast, pearl fishing. The luxuriant forest growth which covers part of the country affords much valuable timber, little of which, however, has as yet been cut. The only important cities are Panama and Colon, which are described under their respective titles.

One of the first European settlements on the American continent was made at Darien, and since 1535 the isthmus has been considered of unusual importance on account of the transit of passengers and merchandise from ocean to ocean. In 1718 Panama was incorporated as

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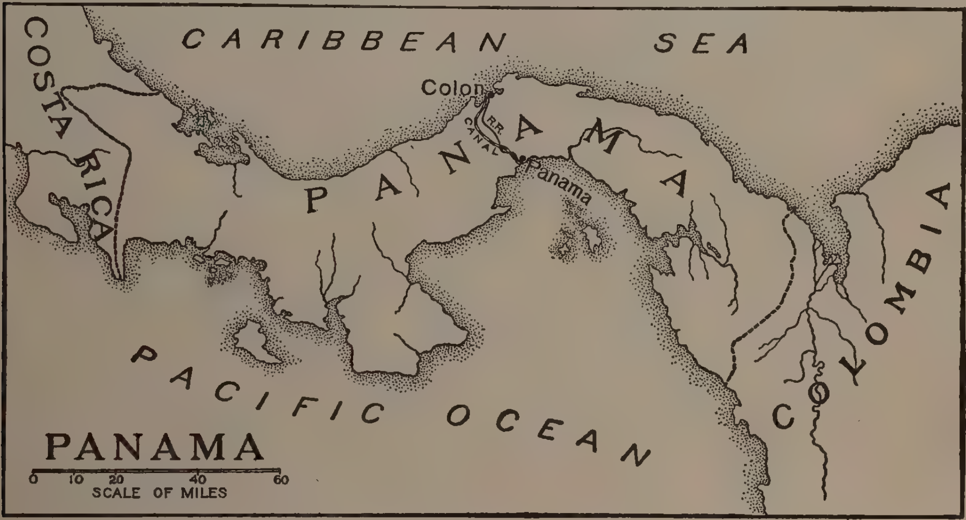
CULEBRA CUT, PANAMA CANAL

a department of the Republic of New Granada. In 1859 this union was dissolved, and the state continued as an independent government until 1861, when it returned to its former political dependence. Its relations to the government of Colombia were political only. In 1846 the United States ratified a treaty with New Granada by which it guaranteed the neutrality of the isthmus and free transit over the Panama Railroad. After that date American interference was necessary a number of times, in order to maintain the integrity of the railroad and the isthmus. On account of its geographical position Panama is of great strategic importance, and when in August, 1903, the United States of Colombia rejected the treaty providing for the construction of the Panama Canal by the United States, the inhabitants of Panama felt that their interests were imperiled to such an extent as to warrant their withdrawal from the government and the establishment of an independent state. Accordingly, in November, 1903, the Republic of Panama was constituted, and in January of the following year a convention met and adopted a constitution. The United States immediately recognized the new republic and concluded with it a treaty for the construction of the Panama Canal. Population, estimated at 340,000. See PANAMA CANAL.



Panama Canal, a canal to extend across the Isthmus of Panama from Colon, on the Caribbean coast, to Panama, on the Pacific.

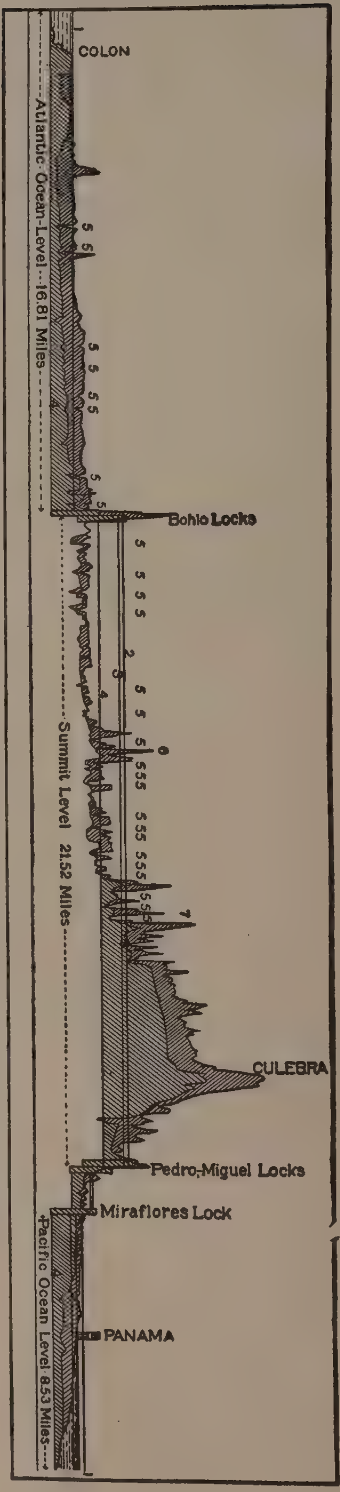
EARLY HISTORY OF THE ISTHMIAN CANAL. The question of an isthmian canal is more than three centuries old. The first desire for such a canal was aroused by the Spanish conquest of Peru and Chile. At that time Ferdinand, king of Spain, proposed to cut a canal through the Isthmus of Panama, so as to secure easy access to his new possessions, and his successor, Philip, thought favorably of a route across Nicaragua, but on account of European complications nothing was done with either project.

In 1665 Great Britain became interested in the Nicaraguan route, and for the next quarter of a century she attempted to gain control of it. The explorer Von Humboldt, who visited Central America early in the nineteenth century, saw the advantage and necessity of such a canal and expressed his belief that sometime it would be constructed by the United States.

The United States government first became interested in the isthmian canal project in 1825, when its representative to Nicaragua secured concessions for the construction of such a canal, and the following year Henry Clay, who was secretary of state, ordered an examination of the route, but the matter was dropped soon after. Three years later, the king of Holland obtained a franchise for the construction of the canal, but this plan was annulled the following year, and nothing further of importance was done until 1847, when Great Britain obtained control of the proposed route. Great Britain's claim was disputed by the governments of Nicaragua and the United States, and no steps were taken to push the work. In 1849 Cornelius Vanderbilt formed a company which secured concessions from Nicaragua for the construction of a canal. In the meantime the discovery of gold in California increased the demand for such a waterway, and the Vanderbilt company began operations. After spending about two millions of dollars, however, they found that the project was beyond their ability and attempted to secure the aid of the United States government. This aid was refused, and the project fell through.

Panama Canal. The history of the Panama Canal proper dates from 1878, though some years previous to this, George M. Totten, chief engineer of the Panama railroad, made a tentative survey for a canal, following the line of the railroad, and showed the feasibility of its construction, estimating the cost at from $60,000,000 to $150,000,000. His report was followed by a government survey, under the direction of Commander E. P. Lull of the United States navy. This survey resulted in locating the canal practically on the present route. In 1878 a concession was given Lieutenant Weyse and others by the government of Colombia to construct and maintain a canal across the isthmus. In the year following, a congress of engineers was called at Paris, under the direction of Ferdinand De Lesseps. This congress consisted of 135 delegates, most of whom were engineers, and eleven of whom were from the United States. After a thorough discussion of the various routes proposed, the congress decided unanimously that the Panama route was the most desirable, and it was selected. Immediately after the adjournment of the congress the Interoceanic Ship Canal Company was organized, and De Lesseps, under whose direction the Suez Canal had been constructed, was made president. This company proposed to cut a sea level canal 29½ feet deep, from 72 to 78 feet wide at the bottom and from 92 to 164 feet wide at the surface. The length of the canal, including harbors, was to be 46.09 miles, and 43.02 miles without the harbors. De Lesseps estimated that the cost would be $127,000,000, which was considerably less than the estimate made by the congress. At the close of 1888 this company had expended $200,000,000 and had not completed one-third of the work. Being pressed for funds, the company resorted to bribery as a means of securing additional aid, and their operations grew into the most noted financial scandal in French history. The company was finally declared by the government to be bankrupt, and a receiver was appointed.

The receiver was authorized to organize a new company and to proceed with the construction of the canal. On account of legal difficulties, pending the settling of the affairs of the old company, the new organization was not formed until 1894. This company, known as the Panama Canal Company, was capitalized at $13,000,000, and stock to the amount of $1,000,000 was given to the United States of Colombia. The company abandoned the sea level project and substituted a series of locks



1, mean ocean level; 2, high water; 3, low water; 4, bottom of canal; 5, Chagres River; 6, San Pablo; 7, Obispo. Upper shading shows work done by French company. Lower shading shows work to be done by United States.

in place of it, since this would greatly reduce the expense of construction. During the next few years a little work was done and about $8,000,000 had been expended when the company again ceased operations.

In the meantime, several events had occurred to keep alive the interest in the Nicaragua route, and in 1895 the Congress of the United States authorized the appointment of a commission to investigate thoroughly its advantages. At that time it seemed that there was no possibility of the completion of the Panama Canal by the French company. This commission, generally known as the Ludlow Commission, made a tentative survey of the Nicaragua route and reported to Congress. In 1899 President McKinley was authorized to appoint a larger commission, with powers to make a more thorough and complete investigation. This is generally known as the Walker Commission, from its chairman, Rear Admiral John G. Walker of the United States navy. Admiral Walker was assisted by a number of the most eminent engineers of the country, and after a very thorough investigation, the commission reported in favor of the construction of a canal by the Nicaragua route, stating that the principal reason for this report was the financial difficulty involved in purchasing the right of way from the Panama Canal Company, who wanted $102,400,000 for their franchises and property, while the estimate of the commission on the value of these assets was $40,000,000.

Immediately after this report was rendered to Congress, the French company offered to sell to the United States their entire claims, including franchises, machinery, right of way and the Panama railway, for $40,000,000, the value placed upon them by the commission. Following this offer the commission made a supplemental report recommending the purchase of the property and the adoption of the Panama route. In the meanwhile the House of Representatives had passed a bill authorizing the construction of the canal by the Nicaragua route, but this bill was rejected by the Senate in view of the supplementary report of the commission, and in place of it the Senate passed the Spooner Act, which authorized the president to purchase of the Panama Canal Company all their assets pertaining to the canal, for the sum of $40,000,000, providing a valid title to the property could be secured and a satisfactory treaty for the construction and control of the canal could be ratified with the United States of Colombia. This measure was accepted by the House and became a law in June, 1902.

In pursuance of the provisions of this act, a treaty was negotiated between Honorable John Hay, secretary of state of the United States, and Dr. Herran, minister plenipotentiary from Colombia, and presented to the Senate of the Fifty-seventh Congress, in January, 1903. The treaty provided for the construction and control of the canal by the United States and the payment to the United States of Colombia of $10,000,000 in gold for the concessions granted, and an annuity of $250,000 a year after nine years following the ratification of the treaty. At an extra session of the Senate this treaty was ratified on March 18, 1903, and sent to the Colombian government. After several months of delay, during which the treaty was the subject of several stormy debates in the Colombian Senate, it was rejected by that body before its final adjournment in August. This rejection led to the immediate withdrawal of the senators from the State of Panama, and ultimately to the secession of that state and the formation of a new republic. This was soon recognized by the United States government.

Immediately after its organization the government of Panama sent to the United States Senate a treaty providing for the construction of the canal on nearly the same terms as were embodied in the treaty with the United States of Colombia. This treaty was ratified by the United States Senate, February 24, 1904 (See PANAMA, REPUBLIC OF).

Early in March, 1904, President Roosevelt appointed a canal commission, with Admiral Walker as chairman. The commission organized and began active operations within a month from the time of its appointment. On May 4, 1904, the commission took formal possession of the canal property, and the payment of the $40,000,000 was promptly made to the French company. Thus was closed a question which, for more than half a century, had been an element of uncertainty in the international affairs of both Europe and America.

The canal extends from a six-fathom line in Colon harbor, on the Atlantic, to a six-fathom line off Panama, on the Pacific. The first 16 miles, from the Atlantic to Bohio, is a tide level canal. At Bohio a dam will be thrown across the Chagres River. This dam will be of sufficient height to form a lake in the valley of the Chagres, whose surface will be 90 feet above sea level and whose area will be sufficient to provide for all overflow in the rainy season. At this point there will be a set of locks whose combined lift will be 90 feet. From these locks the canal traverses Lake Bohio for 14 miles. There are two sets of locks at the Pacific terminus of the summit level, 8½ miles from the Pacific terminus.

The effect of the Panama Canal on the world's commerce will probably exceed the anticipation of those who were the most influential in securing the passage of the measures by which its construction is assured. Its strategic importance is even greater than that of the Suez Canal, and its opening will change many of the ocean routes of the world. It will also constitute a waterway which will become a strong competitor of the transcontinental railway lines, and probably it will divert from them a considerable portion of the traffic.

From a national point of view, the completion of this canal will be invaluable, as it will give ready water communication between the Atlantic and Pacific coasts and will also place Hawaii and the Philippine Islands, in point of communication, several thousand miles nearer the seat of government than they now are.

Panama Congress, the congress held at Panama in June, 1826, including representatives of the various American nations, for the purpose of considering questions of common interest, including the slave trade, the recognition of the new Republic of Haiti, the freeing of Cuba and Porto Rico and other kindred topics. The United States was invited to send delegates, but it was only after one of the most bitter debates in American history that two envoys extraordinary were finally appointed. One American representative died on his way to the Congress, and the other failed to arrive before adjournment. The Congress held ten sessions and signed a treaty of perpetual alliance against Spain. It then adjourned to meet in Mexico, but this meeting was never held.

Pan-Amer'ican Congress, a congress of delegates from the Republic of Mexico and the Central and South American states, assembled at Washington, Oct. 2, 1889, for the purpose of discussing the formation of an American Customs Union, under which the trade of American nations with one another might be maintained. The congress continued without final adjournment for five months and voted to recommend the establishment of regular communications between the ports of the several American states, common trade and customs regulations, weights and measures, patent, copyright and trade-mark laws, a common legal tender silver coin and a plan for arbitration of all questions and disputes. The body was brought together through the efforts of James G. Blaine, and he presided at its meetings.

THE CONGRESS OF 1901–1902. The second Pan-American Congress, embracing all the American republics, convened in the city of Mexico, Oct. 22, 1901. The main purposes of this congress were the same as those of the former. Plans for the construction of a railway to connect North and South America, for the establishment of a standard coin which shall be legal tender in all the countries represented, for a uniform system of quarantine and, in general, for bringing the American republics closer together in all their relations and interests, were recommended. A plan for arbitration based on that of the Peace Conference at The Hague, was adopted. The congress adjourned Jan. 31, 1902. See BUREAU OF AMERICAN REPUBLICS.

THE CONGRESS OF 1906. The third congress was held at Rio de Janeiro, Brazil, in July and August, 1906, and was attended by representatives of all important nations of North America, South America and Central America. The principal topics under discussion were commercial relations, the codification of laws, the regulation of patents, the improvement of methods of sanitation, the construction of the Pan-American railway, the consideration of means of arbitration of disputes between nations and, most important of all, the discussion of the Drago or Calvo Doctrine. This, in effect, declares that debts owing by South American nations to nations of Europe cannot be collected by forcible intervention. After considerable discussion, this subject and that of arbitration were referred to the Hague Peace Conference for determination. The Congress of 1906 was attended by Elihu Root, secretary of state of the United States, who at the congress and in other South American cities made forceful addresses in favor of closer relations between the American republics.

Pan-American Exposition, an exposition held at Buffalo, N. Y., from May to November, 1901, to show the progress made by the American republics during the nineteenth century. The expense of the exposition, amounting to $10,000,000, was assumed by the citizens of Buffalo. The exposition was formally opened May 20 and was closed November 2. Eighteen countries, including Cuba and Haiti, made exhibits. Venezuela, Paraguay and Uruguay were not represented; the United States government spent $500,000 in special exhibits, and most of the states were represented by buildings and exhibits.

Architecturally the Pan-American Exposition will have an abiding place in American history. The buildings were of styles common in the South American countries, the harmonious blending of the colors producing a veritable "Rainbow City." The electric tower, which was the focus of the architectural scheme, stood 409 feet high, while from its base gushed a torrent of water, brought directly from Niagara River.

The most noteworthy feature of the exhibition was the multiform use of electricity, in which it far excelled all previous expositions. Its illumination was particularly brilliant, millions of low-power incandescent lights shedding an even, brilliant light over the whole inclosure.

Panay, *pa nī′,* an island of the Philippines, one of the Visayan group. See PHILIPPINE ISLANDS.

Pan′creas, THE, a long flat gland, in structure like the salivary glands, that lies just behind the stomach. It is about eight inches long, two and a half inches wide and one inch thick, and it communicates with the intestine by a duct which runs the length of the pancreas and pours its contents into the duodenum. The pancreatic juice acts on starch, on fat and on proteids, changing the last into peptones, which resemble those formed by the gastric juice. It separates the fats into minute particles and into their chemical parts, namely, glycerine and an acid peculiar to each fat. The alkaline quality of the juice then makes soap of the fatty acids. See DIGESTION; PEPTONES; PROTEIDS.

Pancreatin, *pan′cre at′in,* used as an aid to digestion, is extracted from the pancreas of a hog, killed about six hours after a full meal. The elements of pancreatin are *trypsin,* which digests proteids; *amylopsin,* which has the power of converting starch into sugar; *steapsin,* which emulsifies fats, and a property that will curdle milk. See DIGESTION.

Panda′nus. See SCREW PINE.

Pando′ra, in Greek mythology, the first woman on earth. Jupiter, angered at Prometheus for stealing fire from heaven for mankind, determined to punish man as well as Prometheus. To accomplish the former purpose he created a woman. All of the gods bestowed gifts on her, and by reason of this she was called Pandora, which means *all gifts.* Mercury was instructed to take Pandora to Prometheus, who refused, however, to receive her. She was then taken to Epimetheus, the brother of Prometheus, who gladly took her into his house. A short time afterward, Mercury appeared with a box, which he left in the care of Pandora, giving her strict instructions not to open it. Her curiosity was too strong, however, and she removed the cover from the box, thus releasing all of the ills which have since troubled mankind. After the last of these was out, she heard a sound within the box, and on raising the cover she discovered Hope within. According to other accounts, the box contained blessings, which, with the exception of Hope, flew away when the box was opened and were lost.

Panorama, *pan o rah′ma,* a picture of the whole landscape as viewed from one position. It may be either a painting or a photograph, or a combination of the two, and occasionally plastic effects are used to heighten the illusions of perspective and light and shadow. In the case of a large painting a panorama is often stretched about the interior walls of a cylindrical room, the platform from which it is viewed being placed in the center. Panoramic photographs are usually mounted upon plain board. Among the great panoramas was that of the Siege of Paris, a painting by Philippoteaux, exhibited in 1875. Another famous one was the Battle of Gettysburg, which was produced in 1888.

Pansy. See ALDEN, ISABELLA MCDONALD.

Pansy. See VIOLET.

Pan′theism, in philosophy, the doctrine which considers God and the material universe to be identical. Pantheism has been the foundation of nearly all the chief forms of religion which have existed in the world. It was represented in the East by the Sankhya of Kapila, a celebrated system of Indian philosophy. The Persian, Greek and Egyptian religious systems were also pantheistic. Spinoza is the most representative pantheist of modern times. A twofold division of pantheism has been proposed—(1) that which loses the world in God, one being in whose modifications are the individual phenomena; (2) that which loses God in the world and totally denies the substantiality of God. Pantheism is generally considered atheistic by the followers of Christianity.

Pan′theon, a celebrated temple at Rome, the best preserved of the ancient buildings; built in 123 A. D. by the emperor Hadrian. It is a large edifice of brick, built in circular form, 142 feet in diameter. It has the finest dome in the world, measuring 142½ feet in internal diameter and 143 feet in internal height, and its portico, almost equally celebrated, is supported by sixteen Corinthian columns of Egyptian marble. It is now a church and is known as Santa Maria Rotonda. Raphael and other famous men are buried within its walls.

The Pantheon in Paris, for some time the Church of Saint Géneviève, is a noble edifice with a lofty dome, devoted to the interment of illustrious men of France.

Panther, one of the cat family, now supposed to be identical with, or a mere variety of, the leopard in the old world and the puma in this country. See LEOPARD; PUMA.

Pan′tomime, the expression of thoughts and emotions through gestures and actions and without words. This art was developed by the ancient Romans. In the earliest pantomimes, only one actor was upon the stage at a time, but later, several acted together. They at first wore masks. The art of pantomime flourished throughout the days of the Empire, and it later spread to Italy and France, where in the seventeenth and eighteenth centuries it had great vogue. The first pantomime in England was probably early in the eighteenth century. It was there that the well-known Christmas pantomime was originated, with the old characters of Harlequin, Columbine and others. At other times than Christmas, pantomimes were given, however, the basis of the acts being found usually in the old fairy tales or in the *Arabian Nights*. Only occasional attempts have been made to produce pantomimes in the United States, the most noteworthy one being the *Humpty Dumpty*, which gained popularity about 1870.

Pa′pacy. See POPE.

Pa′pal States or **States of the Church,** the name given to that part of central Italy which, until the latter half of the nineteenth century, was subject to the temporal authority of the pope. The territory extended irregularly from the Adriatic to the Mediterranean and latterly comprised an area of about 15,000 square miles. Rome was the capital. The Papal States were, with the exception of the capital and the land immediately adjoining, made a part of the territory of Victor Immanuel in 1860, and Rome was annexed to the kingdom of Italy ten years later. At this date the temporal authority of the pope ceased, except over his palace, the vatican.

Papaw′ or **Pawpaw′,** a small tree that grows in the United States and bears a fruit from two to six inches in length and an inch or so in diameter. This fruit has a thin rind, numerous large, kidney-shaped seeds and a sweetish, soft pulp. It is not generally cultivated, except as an ornamental tree.

PAPAW

Paper, a thin, flexible substance, made from vegetable fiber and used in writing and printing and for many other purposes. Paper takes its name from *papyrus*, a plant used by the Egyptians for a fabric upon which to write; but papyrus was not paper, and the art of paper-making did not originate with its use (See PAPYRUS). It is not known who discovered this art, but paper was made by the Chinese two centuries before the beginning of the Christian era, and they were probably the inventors. Paper was in use in Europe during the eleventh century, and by the thirteenth century it was well known. By the beginning of the fourteenth century it had become common in England, but it was not manufactured there until 1685. The first paper mill in the United States was built near Philadelphia in 1690, but it was more than one hundred years before paper was manufactured in large quantities in this country.

MANUFACTURE. Paper can be made from any vegetable fiber, also from silk and wool, though these substances are not desirable. Formerly all paper was made from cotton and linen rags, and the work was performed entirely by hand labor. The rags were cleaned, freed from all buttons, threads, knots or other portions that would hinder their being worked into pulp. They were then soaked and ground into a fine pulp, which was floated in water. The consistency of the pulp determined the thickness of the sheet of paper. The tank in which it was confined was continually stirred to secure an even distribution, and the paper was made by dipping shallow boxes, called *deckles*, with bottoms of wire screening with fine meshes, into the tank containing the pulp. The water was allowed to drain out as the box was raised. This left a thin coating of the pulp evenly distributed over the wire screen. The box was then inverted over a layer of felt, upon which the forming paper fell. These layers were laid in piles, and more water was pressed from the paper. After this the sheets of felt were spread out until the paper became dry enough to hold together. The drying process was then completed by hanging it upon lines, either in a yard around the mill or in a drying room. The size of the sheet was determined by the size of the box. The paper manufactured in this way had a very rough surface and was of poor quality.

Paper is now made entirely by machinery, but the processes common to the old hand mill are still in use. The rags are thoroughly washed, then shredded by machinery and passed through three sets of grinders, called *engines*, to reduce them to a pulp. These grinders consist of knives, fastened to revolving cylinders and playing between smaller knives in the bottom of an oval tank. The rotation of the cylinder gives the water in the tank a motion which draws the pulp under the grinder. During the process the necessary bleaching matter, sizing and coloring matter are added. When the grinding is completed, the pulp resembles a quantity of rice and milk. From the last grinder it is sent to the storage tank, from which it is pumped to the paper-making machine. All machine-made paper is now manufactured on what is called the *Fourdrenier* paper-making machine. It is from 125 to 150 feet long, and its width depends upon the size of the paper it is designed to make. The machine is divided into three sections—that which receives the pulp and forms it into the sheet or web; that which dries the paper, and the finishing rolls, which are usually known as the *calender* rolls. The drying section contains a number of hollow steel cylinders, from one to three feet in diameter; they are heated by steam, which enters through the trunnions on which they turn. The calender consists of a number of solid steel rolls, which press and polish the paper as it passes between them.

The paper-making section of the machine is the most intricate and also the most interesting. It consists of a long, narrow trough, into which the pulp is pumped; an endless belt of wire cloth, about thirty feet long, mounted upon numerous small rollers and having beneath it a number of vacuum boxes which are connected with air pumps; an endless belt of felt, which extends from the belt of wire cloth over the first sets of drying rolls, and the *dandy* roll, which is a small roll covered with wire cloth and placed above the paper at the point where the belt of wire cloth meets that of felt.

The pulp is pumped from the storage tank into the trough, from which it flows in a wide, thin stream upon the belt of wire cloth. This has a vibrating motion from side to side, which weaves the fiber together and strengthens the texture of the paper as the pulp passes over it. Most of the water falls through the meshes of this cloth as the pulp passes along, and the vacuum boxes assist in drawing out much of the remainder. The even edges of the paper are secured by rubber bands, called *deckle bands*, on each side of the belt. The dandy roll presses down upon the upper surface of the paper and determines the style or quality. When the roll is covered with wire cloth of the same structure as that of the belt, a *wove* paper is made. When the roller contains wire bands which make straight parallel lines in the sheet, a *laid* paper is made. The *water mark*, which is seen by holding a sheet of paper to the light, is produced by placing the design upon the dandy roll and is impressed upon the web at each revolution of the roller. This is a guarantee of the quality and is found on all good grades of paper.

When the paper leaves the wire belt, it is practically completed, and all of the other operations consist in drying and finishing it. The belt of felt takes the web from the wire belt and carries it to the first set of drying rolls, from which it passes on to succeeding sets, until all of the water has been expelled. The felt accompanies the web through three or four sets of rollers, until it has become sufficiently strong to withstand the strain of the machine. From the drying rollers the paper passes to the calender machine, if there is one, and as it passes from the calender, it is either wound into rolls or cut into sheets, according to the use for which it is intended.

The enormous demand for paper has for many years made it necessary to employ other material than rags, and now wood is very generally used in the manufacture of paper for newspapers and for the cheaper grades of books. With the exception of transforming the wood into pulp, the process of manufacture is the same as that already described. Wood pulp is made by cutting the logs into short lengths, which are split into pieces and ground down on rapidly revolving grindstones, operated by steam or water power. Wood fiber is made by digesting short pieces of wood in boilers containing a dilute solution of sulphuric acid, heated to a high temperature. The pulp and fiber are mixed in proper proportions to give the paper sufficient strength, and after bleaching they pass through the paper machine in the same manner as paper made from rags.

Some of the coarsest grades of paper are made of wheat straw, and other grades are made of Esparto fiber and corn husks. Most of the tissue paper is made from hemp, old ropes being the material generally used.

VARIETIES. There are many grades and varieties of paper. The best quality is known as *linen* paper; it is generally used for writing paper and for printing bonds and other documents that are to be preserved for a long time. However, scarcely any of the so-called linen paper is made wholly of linen rags; in fact, much of it contains only a small proportion of linen. The ordinary writing paper and most of that used in printing magazines and books is made of a mixture of rags and wood pulp. However, if a large proportion of wood is used, the paper soon turns yellow on exposure to the light. *Manila* paper takes its name from Manila hemp, though much of the paper so named does not contain any of that material. *Japanese* and *Indian* papers are noted for their peculiar texture, which is due to the method employed in their manufacture. These are usually handmade.

The United States manufactures more paper than any other country, and the annual output exceeds one and one-third million tons. See BOOK; NEWSPAPER; PRINTING.

Paper Hangings. See WALL PAPER.

Paphos, *pa′fos,* the name of two ancient cities in Cyprus, Old Paphos, upon a height, a little more than a mile distant from the southwestern coast, and New Paphos (modern Baffo), on the seashore, seven or eight miles to the northwest of Old Paphos. The first was famous in antiquity for the worship of Venus. During Roman rule New Paphos was the official seat of the government of Cyprus.

Papier-Mache, *pah pyay′mah shay′,* paper pulp pressed into shape, much used in the manufacture of boxes, trays and light articles. It is covered with a coat of hard varnish that takes a fine polish. Sometimes it is beautifully inlaid or decorated by painting or in other ways. The natives of India, China and Japan were the first to manufacture it, but the Europeans now make it in large quantities. A substitute for the true papier-maché is now made by gluing together thick sheets of coarse paper and putting them under very heavy pressure. Thick pasteboard is also used as a substitute and is known by the same name.

Papillae, *pa pil′lee.* See SKIN, THE; TONGUE.

Pap′ua. See NEW GUINEA.

Papy′rus, a water plant which furnished the material upon which the ancient Egyptians did their writing. The root is very large, hard and creeping, and the triangular stem is several inches in diameter and from twelve to fifteen feet high. Formerly it was extensively cultivated in Lower Egypt, but it is now rarely seen there. It is abundant in the warmer regions of Africa in many places and is found in southern Italy. The inhabitants of some countries where it grows manufacture it into various articles, including sail cloth, cordage, wearing apparel and boats. Among the ancient Egyptians its uses were equally numerous. The paper obtained from it consisted of thin strips, carefully separated from the stem longitudinally, laid side by side and then covered transversely by shorter strips, the whole being fastened together by the use of water and some gummy substance. These mats were fastened together to make one long roll, in case the writing was extensive. The writing materials were a reed pen and an ink made of animal charcoal and oil. Thousands of these papyri or papyrus rolls still exist. Many of them were found in the ruins of Herculaneum, but their contents, so far as deciphered, have been of only moderate value. Papyrus was used in Europe till the Middle Ages and was an important export from Egypt. See BOOK; PAPER.

Para, *pah rah′,* or **Belem,** a city and seaport in Brazil, capital of the Province of Para, on the right bank of the estuary of the Para River. The principal buildings are the governor's palace, the cathedral and the bishop's palace. There is in the city a lyceum, a seminary, a public library, a botanical garden and a museum. The port, defended by forts, admits vessels of large size. The principal exports of the city are cacao, rubber, Brazil nuts, isinglass, rice and drugs. Other exports are numerous. Population in 1900, estimated at 75,000.

Par′able, a short story of events which might occur in real life, told not for entertainment, but for the pointing of a moral. The Bible contains numerous parables, which, by reason of their directness and their close relation to the lives of the hearers, surpass all others that have ever been written. Among the most familiar of the

Biblical parables are, in the Old Testament, the story of the ewe lamb, told by Nathan to David; in the New Testament, the parables of the sower, the tares, the mustard seed, the good Samaritan, the prodigal son, the rich man and Lazarus, the ten virgins and the talents.

Parab′ola. See CONIC SECTIONS.

Paracelsus, *par a sel′sus,* the assumed name of Philippus Aureolus Theophrastus Bombastus von Hohenheim (1493–1541), a Swiss physician and alchemist. In the course of his travels he became acquainted with remedies not in common use among physicians, by means of which he performed extraordinary cures and obtained great reputation. In 1526 he accepted the chair of medicine offered him by the magistrates of Basel and lectured there till the spring of 1528. He died at the hospital of Saint Sebastian at Salzburg, of a broken neck, received when he was thrown from a window by the servants of a physician he had insulted. For a long time he was regarded as little better than a charlatan, but in spite of his arrogance, drunkenness and the hatred he inspired, he enriched science, particularly chemistry and medicine, with some valuable discoveries.

Parachute, *par a shoot′,* an apparatus of an umbrella shape and construction, usually about twenty or thirty feet in diameter, attached to balloons, by means of which the aeronaut may descend slowly from a great height. It is shut when carried up and expands of itself when the aeronaut begins to descend; but it is not altogether to be depended on, and accidents in connection with its use have been frequent. The earliest mention of a machine of this kind is in a manuscript describing experiments made with one in 1617. In 1783 the French physician Lenormand made several experiments at Montpellier; and shortly after the machine became well known through the descents of Blanchard in Paris and London. See BALLOON.

Par′affin, a solid white substance, of a waxy appearance, which is separated from petroleum and ozokerite and is very largely obtained by the destructive distillation of various organic bodies, such as brown coal, or lignite, bituminous coal and shale. The process generally consists in heating bituminous shale in iron retorts at a low red heat; condensing the tarry products and purifying these by distillation, by washing successively with soda, water and acid, and again by distillation. Those portions of the oil which solidify in the final distillations are collected separately from the liquid portions, washed with soda and acid and crystallized or again distilled. The partially purified paraffin is again treated with acid, is allowed to solidify, is submitted to the action of centrifugal machines and finally is strongly pressed, in order to remove any liquid oil which may still adhere to it. The refined paraffin is largely manufactured into candles, which may be either white or colored. Paraffin is also used for vestas and tapers, for water-proofing, sizing and glazing fabrics, as an electric insulator and as a coating for the inside of beer barrels. The liquid oils obtained in the process come into commerce under the general name of paraffin oil, the lighter oils being used for lubricating purposes. See PETROLEUM.

Paragua, *pah rah′gwa.* See PHILIPPINE ISLANDS.

Paraguay, *par′a gway* or *pah′ra gwi,* a republic of South America, between the parallels 22° 4′ and 27° 35′ south latitude and between the meridians 54° 32′ and 58° 40′ west longitude. It is bounded on the n. by Bolivia and Brazil; on the e. by Brazil and Argentina, and on the s. and w. by Argentina. The Paraná River forms a part of the eastern and southern boundary, and the Pilcomayo and Paraguay rivers form the western boundary. The length from north to south is about 375 mi., and the greatest length from east to west is a little over 400 mi. The area is 157,000 sq. mi., or a little less than that of California.

The whole surface belongs to the basins of the Paraguay and Paraná rivers, numerous tributaries of which intersect the country. Along the Paraguay and in the south, adjoining the Paraná, are extensive swampy tracts; westward of the Paraguay the country is little known. Elsewhere the surface is well diversified with hills and valleys and rich alluvial plains. The climate is agreeable, the mean annual temperature being about 75°. The natural fertility of the soil is shown by a vegetation of almost unequaled luxuriance and grandeur. In the forests are found at least sixty varieties of timber trees, besides dye-woods, gums, drugs, perfumes, vegetable oils and fruits. Many of the hills are covered with the *yerba mate,* or Paraguay tea. The larger plains are roamed over by immense herds of cattle, which yield large quantities of hides and tallow; and on all the cultivated alluvial tracts sugar cane, cotton, tobacco, rice and maize are raised in profusion. The chief exports are Paraguay tea, sugar, tobacco, fruits, cotton, rubber, hides, tallow, cattle, horses, mules, wool, leather and an extract extensively used in tanning, known to commerce as *quebracho*. The imports consist almost wholly of manufactured goods, foodstuffs and machinery.

The government is a republic. The executive power is vested in a president, who is elected for four years and is assisted by five ministers. The legislative department consists of a Congress comprising a Senate and a House of Deputies, the members of each being chosen by universal suffrage. The Roman Catholic Church is the State church, but all religions are tolerated. There is a national college and an agricultural school at Asuncion, but, as in most other South American countries, the educational system is not well developed. The inhabitants are of mixed Spanish and indian blood, besides the native indians, many of whom are civilized.

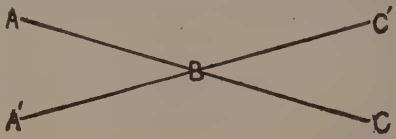
The chief cities are Asuncion, the capital, Paraguari and Villa Rica.

Paraguay was originally a Spanish colony, the first settlement being made in 1535. In 1608 a number of Spanish Jesuits established a powerful and well-organized government, which lasted till 1758, when it was overthrown by the Brazilians and Spaniards. Early in the present century its isolated position enabled it by a single effort to emancipate itself from Spanish rule. Doctor Francia, secretary to the revolutionary junta in 1811, was elected consul, but exchanged the name for that of dictator in 1814, and thenceforward, by a rigorous system of espionage and the strict prohibition of all intercourse with other nations, he retained his position till his death in 1840. In 1844 Don Carlos Antonio Lopez was elected president for ten years, and soon after, the country was declared free and open, to both foreigners and foreign commerce. Don Carlos Lopez remained president of Paraguay till his death in 1862, when he was succeeded by his son Don Francisco, who concluded treaties of commerce with the United States and the leading European nations and did all in his power to promote the growth of agriculture and industry in the land. But a disastrous war with Brazil and the Argentine Republic, which broke out in 1864 and only closed with the death of Lopez in 1870, caused the death of far the greater portion of the male adults and entirely checked the progress of Paraguay. A popular constitutional government has since been established, and the state is now making rapid progress in population and prosperity. Population in 1900, 635,571, of whom 100,000 were indians.

Paraguay, a river of South America, which rises in the State of Matto Grosso, in Brazil, flows in a generally southeasterly direction and joins the Paraná, after a course of almost 1500 miles. It receives the Pilcomayo, Vermejo and other large rivers and is a valuable highway of trade for Paraguay and Brazil.

Paraguay Tea. See MATE.

Par′allax. If a person at A, in the figure, looked at an object at B, it would appear in a line with an object at C. But if he moved to A′, the object at B would appear to move, and in an opposite direction, till it came in a line with C′. This seeming backward motion of B is called *parallax*. The angle ABA′ is the *angle parallax*. In astronomy, parallax is generally used to indicate the differences in direction of a heavenly body seen from the center of the earth and seen from a point on its surface. The heavenly bodies are always located in astronomical calculations as they would be seen from the center of the earth. As the angle of the parallax depends upon the distance of the body from the observer, the astronomer can, by the aid of trigonometry, measure the distance of the heavenly bodies from the earth.



Parallel′ogram. See QUADRILATERAL.

Parallelogram of Forces, an important principle of dynamics, discovered by Newton, which may be stated thus: If two forces, acting in different directions on a body at the same time, be represented in magnitude and direction by two straight lines meeting at the body, their resultant effect, in giving motion to the body, is that of a force represented in magnitude and direction by the diagonal of the parallelogram of which the two former lines are two sides. See COMPOSITION OF FORCES.

Paral′ysis, the impairment or loss of the power of motion. This loss may affect certain parts of the body only, or it may cover one side of the body, or the upper or the lower half, or it may be general and affect both upper and lower extremities. Sometimes there is a loss of motion, while sensibility is retained; and rarely, there is a loss of sensibility, while the power of motion is retained. Paralysis is not a disease, but is a manifestation of disease, usually in a part of the body remote from that affected by paralysis; as, for instance, a wound or a disease of a nerve trunk may cause paralysis in the extremities to which that trunk leads. The ordinary form of apoplexy or paralytic stroke is accompanied by a loss of motion on one side of the body, usually in the extremities and in the muscles of the face and tongue. It is frequently caused by the forming of a blood clot in the brain.

Par′amar′ibo, the capital of Dutch Guiana, about 16 mi. above the mouth of the Surinam. It is a well-built city and is the center of the Dutch West Indian trade. Its chief exports are sugar, rum, molasses and rubber. A hospital for lepers is located near the town. Population in 1900, 31,817.

Paraná, *pah ra nah′*, a river in South America, the largest of the continent, except the Amazon. It is formed in the State of Minas Geraes, in Brazil, by the junction of numerous streams, and it discharges itself into the estuary of the La Plata, the latter part of its course being through the Argentine Republic. Its principal tributary is the Paraguay. Its length from its source to its junction with the Paraguay is about 1800 miles, and its length from the confluence to the formation of the La Plata estuary is about 850 miles more. In breadth, current and volume of water, the Paraná has ten times the magnitude of the Paraguay, which is itself superior to the greatest European rivers. The Paraná is an important waterway to the interior of the country, though it has obstructions at certain points.

Par′apet, in fortification, a wall or rampart, usually of earth, set up to protect soldiers from attacks of the enemy in front. There is a ledge about half-way up the inner side, on which the troops rest their rifles when firing. The name is also applied to the defenses around the roofs of castles. In architecture the term is used to designate a wall or fencing at the edges of balconies, roofs of houses and the like, to prevent people from falling over.

Par′asites, a name applied to animals or plants which attach themselves to others and draw nourishment from their hosts. There are many animal parasites which inhabit various organs in the interior of the bodies of other animals, while there are still more numerous parasites which live upon the exterior of the body. Among the former are tapeworms and flukes, and among the latter, lice and ticks. While true parasites obtain their nourishment from the animals on which they live, there are other plants and animals, to which the name is sometimes given, that obtain only a lodging at the expense of the animals or plants which they accompany. Such a life seems to be that of the lichen. One of the common vegetable parasites is the mistletoe.

Parasit′ic Diseases, diseases produced by parasitic animals or plants. Among the animals producing such diseases are the guinea worm, the louse, the trichina and tapeworms. The vegetable parasites which produce disease in animals are either fungi or algae. Ringworm is an example of this class of diseases. See BACTERIA AND BACTERIOLOGY.

Parch′ment, the skins of sheep or goats, prepared for use as writing material. The skin is stretched on a frame; all the flesh and hair is separated from it, and its thickness is reduced with a sharp instrument and a pumice stone, covered with pulverized chalk or slaked lime. After the skin has been reduced to somewhat less than half its original thickness, it is smoothed and slowly dried. Parchment was in use as early as five or six centuries before the birth of Christ.

Pardon, the remission of the penalty of a crime or offense. In the United States, the pardoning power is lodged in the president and the governors of the various states and extends to all offenses except those which are punished by impeachment after conviction. In some states, concurrence of one of the legislative bodies or of a pardoning board is required.

Parent and Child. This relation has both a natural and a legal aspect, the latter, or legitimate, relation, arising out of marriage, being the one considered in this article. The common law does not compel parents to maintain their children. If the parents fail to support a child unable to earn its own living, the poor law authority performs this duty, and by so doing it can obtain the power, under an order from a proper court, to compel the parents or other relatives to make a contribution for that purpose. Where the child contracts a debt, as for food, clothes or education, the parents will usually be held liable. The common law provided that the father should have the children under his power until their majority; but it is now possible for the mother, in case of separation of the parents, to apply to the courts for rights of access and custody while the children are under sixteen years of age. The latter right is usually granted when the father is shown to be a person of immoral character. At death parents may, under proper will, disinherit their children; but in the event of intestacy the children's share of the real property is divided equally among them.

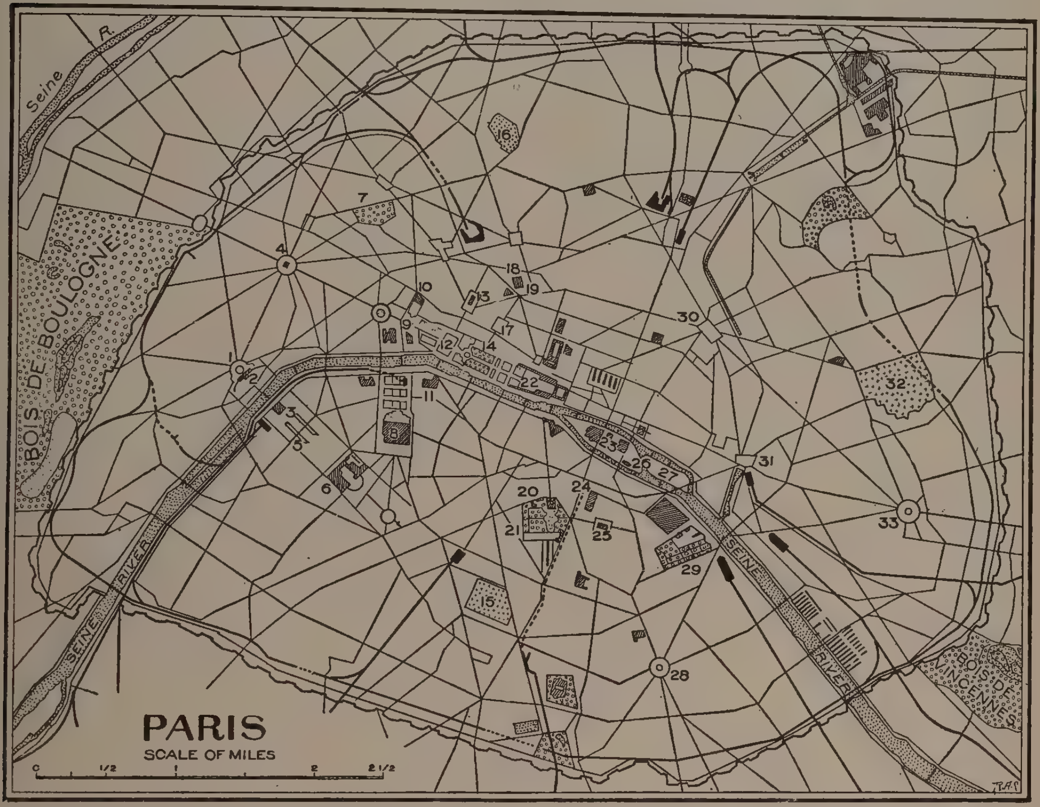
Parhe′lion, a mock sun, having the appearance of the sun itself and seen by the side of that luminary. Parhelia are sometimes double, sometimes triple and sometimes more numerous. They appear at the same height above the horizon as the true sun, and they are always connected with one another by a white circle or halo. They are the result of certain modifications which light undergoes when it falls on the crystals of ice, rain drops or minute particles that constitute suitably situated clouds. Parhelia which appear on the same side of the circle with the true sun are often tinted with prismatic colors. See CORONA; HALO.

Paria, *pah′re a,* GULF OF, an inlet of the Atlantic, on the northeast coast of South America, between the island of Trinidad and the mainland of Venezuela. It is enclosed on the north by the peninsula of Paria. It has good anchorage and receives several arms of the Orinoco.

Par′is, in Greek mythology, the son of Priam and Hecuba. His mother dreamed before his birth that she had brought forth a firebrand, and having been informed by the priests that this meant that her son should cause the destruction of Troy, she had the child exposed on Mount Ida to die. Here, however, he was found by a shepherd, who brought him up as his own son. When he grew to young manhood, his great beauty won him the love of the nymph Oenone, whom he married. They were happy together until, one day, Paris was called to decide a beauty contest between Juno, Minerva and Venus, all of whom claimed the apple which, marked "For the fairest," was thrown into their midst (See APPLE OF DISCORD). Each of the goddesses promised to Paris a reward if he would decide in her favor, but the offer of Venus of the most beautiful woman in the world as his wife was most to his taste, and he awarded the prize to her. Meanwhile, he had discovered his identity and had been recognized by Priam as his son. While on a visit to Greece, Paris was entertained at the home of Menelaus, king of Sparta, whose wife, Helen, the most beautiful woman of her time, he treacherously made love to and carried off. This act was the cause of the Trojan War. During the struggle Paris, according to most accounts, did not conduct himself with any great bravery. After the capture of the city he killed Achilles by shooting him in the heel, and he was himself killed by Philoctetes. See HELEN; TROY.

Paris (Fr. pron., *pa re′*), the largest city of France, and the capital of the French Republic, located on the Seine River, 110 mi. from its mouth. The city proper occupies a level plain on both sides of the Seine and is surrounded by hills, some of which rise to a height of more than 200 feet. A wall 21 miles long surrounds the city and encloses some of the fortified hills. The wall is pierced by numerous gates, but is strongly fortified and has a glacis and a moat on its outside. Beyond the walls, and within two miles of it, are numerous strong fortifications, while as many more guard the approaches from 10 to 40 miles distant. Taken altogether, the defenses of Paris are almost impregnable. The city grew up without a definite plan and contained a dense population, living in crowded houses on narrow, crooked streets, but within the last century the city has been practically remodeled, wide avenues have been opened in every direction and communication is rendered direct and easy by numerous street car lines and omnibuses. Besides these, Paris has an extensive system of underground street railways that are as perfect in appointment and management as any in the world. The building laws of Paris are very strict, and in but few sections of the city do the squalid tenements of old remain. As a whole, it is one of the most beautiful cities of the world, and though in its reconstruction thousands of people suffered from the arbitrary opening of streets and the destruction of old buildings, yet the roomy avenues, the perfect sanitation and the magnificent appearance of the new city have justified the action of its builders. On the Seine River numerous steamboats ply up and down and carry thousands of people to their destinations. Besides this, the Seine is a great thoroughfare for trade and commerce, and its sides are lined with magnificent stone quays, which keep its water within bounds and furnish landing stages and broad esplanades for pleasure and trade. Near the center of the city the Seine divides into two streams and creates the Ile de la Cité, which is covered with fine public buildings. The river, which varies from 300 to 500 feet in width, is spanned by more than 30 magnificent bridges, one of which has been in existence for over 400 years, and others for more than 300 years. Many more have been built at intervals by kings, rulers and by the Republic down to the present time. Many of the bridges are adorned with parkways, with statuary or with historical relics, designed to commemorate great events.

Steam and electric roads connect Paris with its numerous famous suburbs—Boulogne and its famous park and race courses; Versailles, with its palace and beautiful gardens; Saint-Denis, with its cathedral where the kings of France are buried, and a score of others near and farther, each full of historic or artistic interest (See VERSAILLES, PALACE OF; SAINT-DENIS; BOIS DE BOULOGNE). The railroads which connect Paris with the other cities of Europe are numerous and well equipped. They enter the city from different quarters and terminate in fine stations, no less than nine in number, all of which are easily reached by the street and underground railways.



1, Place du Trocadero; 2, Palais du Trocadero; 3, Tour Eiffel; 4, Place de l'Etoile, 5, Champ de Mars; 6, Ecole Militaire; 7, Park Monceau; 8, Hotel des Invalides; 9, Champs Elysées; 10, Palais Elysée; 11, Chambre des Députés; 12, Place de la Concorde; 13, La Madeline; 14, Jardin des Tuileries; 15, Montparnasse; 16, Montmartre Cemetery; 17, Place Vendome; 18, Opera; 19, Place de l'Opera; 20, Palais du Luxembourg; 21, Luxembourg Gardens; 22, Palais du Louvre; 23, Ile de la Cité, 24, Sorbonne; 25, Pantheon; 26, Notre Dame; 27, Ile St. Louis; 28, Place de la Italie; 29, Jardin des Plantes; 30, Place de la Republique; 31, Place de la Bastille; 32, Pere Lachaise; 33, Place de la Nation.

STREETS, PARKS AND BOULEVARDS. A glance at the map will make clear the systems of boulevards and wide streets which radiate from common centers and form the chief arteries of traffic. In the northwest is the Place de l'Etoile (Place of the Star), whence radiate twelve great avenues, chief among which is that of the Champs Elysées, running southeast, under slight changes of direction and name, to the Place de la Bastille, where it meets other diverging streets, one of which continues in the same general direction to the Place de la Nation. The Champs Elysées proper terminates in the Place de la Concorde, which once streamed with the blood of the Revolution and is famous for many other important occurrences. Beyond is the garden of the Tuileries, now the beautiful playground of crowded Paris, and still farther, the Palace of the Louvre, with its wonderful treasures of art and history. Across the river to the south of the Champs Elysées are the spacious grounds of the Hotel des Invalides, which almost meet the Champ de Mars and the wide tract that faces the Palace of the Trocadero, on the north side of the river. South of the river, also, are the charming gardens of the Luxembourg, and farther east, next the river, is the Jardin des Plantes (botanical garden), with its marvelous living collection of plants from all parts of the world. In the northeastern part of the city is the beautiful park of the Buttes Chaumont, where advantage has been taken of high hills and deep ravines to make a most delightful garden. Just outside of the city, to the west, is the Bois de Boulogne, a magnificent park, much of which is still in its natural state, where great trees shadow acres of hillside, interspersed with meadows, lakes and gardens. Among them all run the beautiful drives and charming walks that have made this park famous for many years. Across the city, at the southeast, is the Bois de Vincennes, a smaller, but almost equally beautiful, tract. The cemetery of Montparnasse, in the southern part of the city, and the cemetery of Père Lachaise, in the east, are beautifully kept and attract many visitors to the graves of the famous people buried there.

PUBLIC BUILDINGS, MONUMENTS AND INSTITUTIONS. Paris has long been famed for the magnificence of its churches, palaces and other public buildings. Chief of these is the great Palace of the Louvre, located on the north bank of the Seine, almost in the center of the city (See LOUVRE). Directly south of it, and some distance from the opposite side of the river, is the Palace of Luxembourg, once a royal residence, but now the home of great collections of modern paintings and statuary. The Palace of the Trocadero fronts the Seine on the north bank. It is a huge oriental building, in front of which is a great ornamental fountain. The palace was built in 1878 for the International Exposition, and it still contains many treasures of sculpture and ethnology. Across the river is the Eiffel Tower (See EIFFEL TOWER), and the Champ de Mars, where have been erected the buildings for other international expositions. The Hotel des Invalides has been in existence since 1670 and serves as a home for disabled soldiers. In connection with it is a military museum, with a fine collection of relics. The president of France makes his official home in the Palais de l'Elysée, northwest of the Place de la Concorde, while across the river, south of the square, is the building of the Chamber of Deputies. On the Ile de la Cité is the Palace of Justice, where the law courts are held; it is famous for its prison, the Conciergerie, within which Marie Antoinette, Robespierre and other famous personages of the Revolution were confined. North of the island is the Hotel de Ville (City Hall). Many other elegant public buildings, including the palaces, schools, hospitals and charitable institutions, are located in different parts of the city.

Among the churches the chief is the Cathedral of Notre Dame, situated on the Ile de la Cité (See NOTRE DAME, CATHEDRAL OF). The Madeleine, a modern structure, is a handsome imitation of a Greek temple, and within, it is gorgeously decorated. The Pantheon, which was built originally as a church, is now considered solely as a memorial to the great men of France. The Grand Opera House, which covers nearly three acres of ground, is a magnificent structure that cost about $5,500,000. The chief educational institution is the University of France, which now occupies a large building quite in keeping with other great colleges of the world. In the vicinity of the Sorbonne, which was the name of the building occupied by the old University of France, are the College of France, the Schools of Medicine and Law, the Observatory, the Ecole Polytechnic and the Jardin des Plantes. The Bibliotheque Nationale (National Library) contains nearly 2,750,000 volumes, besides surpassingly great collections of manuscripts, coins and historic relics of various kinds. The art collections of Paris are the pride of France and have been gathered from all parts of Europe. No other city can surpass Paris in the value and interest of these collections.

In the parks and public places of Paris are many fine monuments of various kinds. Besides the statuary which has been erected in memory of famous Frenchmen, there are several very pretentious and remarkable monuments that deserve special mention. In the Place de l'Etoile is the largest triumphal arch in existence. As it is located on a slight eminence, it is visible from almost every part of Paris (See ARC DE TRIOMPHE DE L'ETOILE). In the center of the Place Vendome rises a column 142 feet high, built in imitation of Trajan's column at Rome. On it are represented memorable scenes of the wars of 1805, down to the Battle of Austerlitz. At the top is a statue of Napoleon in his imperial robes. The granite obelisk in the center of the Place de la Concorde once stood in front of the gateway to the great Temple of Luxor, in Upper Egypt. In 1831 this was presented to Louis Philippe by Mohammed Ali, then viceroy of Egypt. The monolith, thickly inscribed with hieroglyphics that tell of the exploits of Rameses II, is reddish granite, from the quarries of Assuan, and is 76 feet high. It rests on a pedestal of French granite 13 feet high. The location of the Bastille, the famous old prison which was destroyed in the Revolution, is marked by a bronze column resting on a base which makes the whole monument 154 feet in height (See JULY, COLUMN OF).

GOVERNMENT. Paris is under the national government, and its chief executive is the prefect of the Seine, appointed by the government. A town council, of which there are 80 members, four from each of the twenty wards or districts of the city, is chosen by the people. Each of the twenty districts, or *arrondissements,* has a mayor and two assistant councilors and is to a certain extent an independent organization, as it assesses and collects its own taxes and administers most of its ordinary affairs, subject, however, to the control of the municipal council. The city is well regulated and policed, and its streets are kept marvelously neat and clean. Many of the public utilities are owned and operated by the city. The tendency is toward municipal ownership of all. Paris has an excellent school system, which provides for the education of its children from the time they are infants until they have passed through high school and are ready for entrance to university or college. Attendance is not compulsory in all schools, but a certain amount of education is required of every child. The control of so many public enterprises and utilities makes the annual expenses of Paris enormous. Although there is an exceedingly heavy debt against Paris, yet the city is prosperous and is paying the debt at a reasonable rate.

COMMERCE AND INDUSTRY. Paris has some large manufacturing establishments, and more are coming into existence, but its chief importance has been in the great number of comparatively small factories or workshops, in which small and elegant articles of all kinds are made in the choicest manner. No other city in the world equals Paris in the excellence and varied character of its objects of art and luxury—perfumes, gloves, artificial flowers, toys, jewelry, botanical and surgical instruments and a host of articles that a luxury-loving world enjoys. Paris is the commercial metropolis of France and has an enormous trade in manufactured articles with the rest of the world. Its stores, many of which are large and on the department plan, are filled with choice articles, which are bought not only by Parisians but by visitors from all over the world, for Paris is and long has been the center of tourist travel from everywhere. The people are still drawn there in great numbers by the beauty of the city, the excellence and varied character of its shops, its treasures of art and the lightness and gaiety of its pleasures.

HISTORY. A village of the Gauls was located on the present site of Paris as early as the time of Julius Caesar, for he mentions it in his *Commentaries.* About 250 A. D. Saint Denis introduced Christianity among the Gauls, and by the fourth century the name *Paris* had taken the place of *Lutetia,* the name of the village before that time. It was not until the sixth century that Paris was chosen by Clovis as the seat of his government. After the tenth century, when Hugh Capet chose it as the capital of the French monarchy, Paris continued steadily to grow in influence and importance. Many of the kings of France contributed to the embellishment of the city, building bridges and quays and establishing palaces and buildings for the treasures of art and literature. The numerous revolutions which marred its progress resulted in the destruction of some notable buildings, but, in spite of all, the city never appeared to go backwards, and even the destructive revolutions appeared to lend themselves to improvements, convenience and beauty. After the Revolution of 1789, Napoleon did much to beautify the city, and his example has been followed by subsequent rulers. The siege of Paris and its occupation by the Germans in 1871 was a great blow to the pride and dignity of the French, but after the evacuation, Paris rapidly regained its power and influence as the capital of cosmopolitan Europe.

POPULATION. At the beginning of this century the population of Paris was about 714,000. In 1880 it had increased to 2,269,000, and in 1901 it was 2,714,068. It is one of the most densely populated cities in the world and has two and one-half times as many people to the square mile as London. Perhaps one-tenth of the population is composed of foreigners, representing most of the nations of Europe. The Roman Catholic religion prevails, but there are more than 500,000 Protestants.

Paris, ILL., the county-seat of Edgar co., 20 mi. n. w. of Terre Haute, Ind., on the Vandalia and the Cleveland, Cincinnati, Chicago & Saint Louis railroads. The city is a residence place in a farming district, producing corn, wheat and broom corn. There are also extensive manufactures of brooms, flour and other articles. The city has a public park of 100 acres and owns and operates the waterworks and electric light plant. It was laid out in 1825 and was incorporated in 1849. Population in 1900, 6105.

Paris, Tex., the county-seat of Lamar co., 100 mi. n. e. of Dallas, on the Frisco, the Atchison, Topeka & Santa Fé, the Texas & Pacific and other railroads. The city is in a rich farming region, producing cotton, corn, oats, alfalfa, fruits and vegetables. It contains cottonseed oil mills and oil refineries, iron foundries, brick works and other factories. The city has a fine Federal building, a hospital, a county courthouse and a poor-farm. There are three national banks, two telephone systems, an electric street railway, electric lights, municipal waterworks and a good sewerage system. The place was settled in 1841. Population in 1900, 9358.

Paris, Louis Albert Philippe d'Orleans, Count of (1838–1894), son of the duke of Orleans and grandson of Louis Philippe. His father died in 1842, and he thus became heir apparent to the throne. After the Revolution of 1848 he lived chiefly in Claremont, England, where he was educated by his mother. During the American Civil War of 1861, he, along with his brother, the duke of Chartres, volunteered in the Northern army and served for some time on the staff of General McClellan. After the Franco-German War he was admitted as a member of the first national assembly, but under the expulsion bill of 1886 he, along with the other princes, was driven from France. He published a *History of the Civil War in America*, a work which displayed much ability.

Paris, Treaties of, the name given to several important treaties of peace, concluded at Paris. The first Treaty of Paris was signed in 1763 and closed the Seven Years' War. By it France ceded to Great Britain, Canada, Prince Edward Island, Cape Breton and all French territory east of the Mississippi River except New Orleans. Great Britain restored to France some of her conquests in the West Indies, but received, in return, territory in India. Spain ceded Florida to Great Britain, and France gave up to Spain, Louisiana, with New Orleans. The importance of this treaty lay in the fact that it established British supremacy in Canada and in India. The second Treaty of Paris, signed September 3, 1783, was concluded between the United States and Great Britain at the close of the American Revolution. Great Britain recognized the independence of the colonies, which were to have possession of the territory as far west as the Mississippi River, between the Great Lakes and the thirty-first parallel of north latitude. It was provided that the Americans might retain their share in the fisheries at Newfoundland and have the exclusive right of fishing on their own coasts. To compensate the British loyalists for the confiscation of their property during the war, it was agreed that Congress should recommend to the state legislatures to restore confiscated estates and to undertake no prosecutions against the loyalists. Great Britain and the colonies were both to have free navigation of the Mississippi. At the same time Great Britain made peace with France and Spain, restoring Florida and Minorca to Spain and ceding Tobago to France.

In May, 1814, was concluded the third Treaty of Paris, between France and the great powers of Europe. The conquests which France had made under Napoleon were taken from her, but she was not compelled to pay an indemnity, nor to restore the works of art which had been brought from conquered countries. The House of Orange regained possession of Holland; Great Britain kept Ceylon and the Cape of Good Hope; the independence of Switzerland was recognized, and it was provided that Italy and Germany should consist of independent small states. All other questions, the treaty provided, were to be settled by a congress of the powers, to be held at Vienna. In November of the following year another treaty was concluded at Paris between France and the great powers, and by this, France, for her acceptance of Napoleon after his first abdication, was punished by having to pay an indemnity of about $200,000,000 and to submit to occupation by a foreign army.

By a Treaty of Paris signed in March, 1856, the Crimean War was closed. One of the most important provisions of this treaty was that no war vessel should ever enter the Black Sea, which should be open to merchantmen of every nation. It was also provided that Turkey should be recognized as one of the powers of Europe, and that no other nation had a right to make attempts against its integrity. Russia gave up her protectorate over Moldavia and Wallachia, which were left under the control of the porte.

The treaty which closed the Spanish-American War was signed at Paris, December 10, 1898, and by it Spain gave up her authority over Cuba, and ceded Porto Rico, the Philippine Islands and Guam to the United States. The United States in turn paid to Spain the sum of $20,000,000.

Paris, University of, one of the oldest and largest universities in the world, located in Paris. It had its origin in a number of schools which became prominent during the twelfth century. Because of a serious conflict which arose between the students and citizens in 1229, a large number of students emigrated to Oxford, but two years later the old differences were settled through the influence of Pope Gregory IX, and most of the students returned. From this time on the university rapidly gained in influence. It attained its highest development during the fourteenth and fifteenth centuries, at which time it was the educational center of Europe and of the Christian world as well. Its decline was due to the establishment of schools of theology in other parts of Europe and to the political dissensions which culminated in the French Revolution. During this struggle the institution was overthrown, but it was reorganized by Napoleon in 1808 as a part of the University of France. The present organization contains the council of the university, the Protestant theological faculty, the medical faculty, which includes the Dupuytren Museum, the law faculty, faculties of science and letters, located at Sorbonne, and the school of pharmacy. The library numbers about 418,000 volumes, and there are over 12,000 students in all departments.

Park, Mungo (1771–1806), an African traveler, born near Selkirk, in Scotland. In 1793 he was engaged by the African Society to trace the course of the Niger. He reached the Gambia at the end of 1795 and, advancing northeastward, arrived at the Niger near Sego. He shortly returned, but in 1805 he accepted command of a government expedition to the Niger. While floating in canoes down the river, his small party was attacked by the natives, and in their efforts to escape, Park and all of his companions were drowned.

Park City, Utah, a city in Summit co., 30 mi. s. e. of Salt Lake City, on the Union Pacific and the Rio Grande & Western railroads. It is in a rich silver-mining district and contains large sampling works, quartz mills and other factories. There is beautiful mountain scenery, and the near-by lakes afford good trout fishing. Population in 1900, 3759.

Park'er, Alton Brooks (1852–), an American lawyer, jurist and politician, born at Cortland, N. Y., educated at the public schools, the Cortland Academy, Cortland Normal School and the Albany Law School. After being admitted to the bar, he practiced in Kingston, and in 1877 he became surrogate of Ulster County. He took an active part in Democratic politics and was offered a high administrative position under Cleveland. In 1885 he was made a judge of the New York supreme court; four years later he became a member of the court of appeals, and in 1898 he was raised to the position of chief justice of that court. In 1904 he was the Democratic nominee for president of the United States, but was defeated, and he returned to the practice of law.

Parker, Francis Wayland (1837–1902), an American soldier and educator, born at Bedford, N. H. He was educated in the public schools and at an academy and began teaching at an early age. At the breaking out of the Civil War, he entered the Union army as a private, but received several promotions and finally became colonel of the Fourth New Hampshire Volunteers. On retiring from the army, he resumed his former vocation and became principal of a grammar school in New Hampshire. He was soon after chosen principal of a normal school in Manchester, Ohio, and later he became superintendent of public schools in Quincy, Mass. His work in Quincy brought him into prominence as an educator. He conducted his school largely on the methods and principles of Pestalozzi (See Pestalozzi, Johann Heinrich), and the system which he developed was entirely different from anything that had before been attempted in the United States. Later Colonel Parker became one of the supervisors of the Boston public schools, and in 1883 he was elected president of the Cook County (Illinois) Normal School, which position he retained for thirteen years, when he became president of the Chicago Institute, a school founded by Mrs. Emmons Blaine for the training of teachers. Later the institute was consolidated with the University of Chicago, becoming the University School of Education. Colonel Parker was made director of this school, and while laboring to organize it on a new and broader foundation, he suddenly died. He was one of the leaders in the advanced educational movement in the United States, and as such he attained a wide reputation. He was opposed to all formalism and all routine in methods of teaching and was an advocate of what he termed a natural method. He was the author of *Talks on Teaching, Quincy Methods, How to Teach Geography* and numerous other works on education, besides many articles contributed to educational periodicals.

Parker, GILBERT, SIR (1862–), a Canadian novelist. He was born at Camden East, Ontario, Canada, and was educated at Trinity College, Toronto. He spent several years in Australia and traveled extensively among the South Sea Islands and in northern Canada. He finally made his home in England, became a member of Parliament and was knighted in 1902. He is the author of more than thirteen works of fiction, besides a book of travel, entitled *Round the Compass in Australia,* and a volume of poetry, called *A Lover's Diary.* Among his works of fiction are *The Battle of the Strong, Donovan Pasha and Some People of Egypt, The Right of Way* and *A Ladder of Swords,* the last a story of court life in the days of Elizabeth.

Parker, HORATIO WILLIAM (1863–), an American composer, born at Auburndale, Mass. He studied with the best teachers in America and attended the conservatory at Munich. After his return he accepted several important appointments as organist in New York and Boston churches and in 1894 became professor of music at Yale. Among his best works is the oratorio *Hora Novissima,* which has been produced under the composer's direction in both England and America with great success.

Parker, THEODORE (1810–1860), an American divine, born at Lexington, Mass. He studied at Harvard University and in 1837 was settled as a Unitarian preacher at West Roxbury. Although his doctrine was accounted heterodox, yet such was his eloquence and ability that he soon became famous as a preacher and lecturer in New England. In 1843 he visited England, France, Italy and Germany, and he settled as a preacher in Boston on his return. He was a prominent advocate of the abolition of slavery. Best known of his published works are *Occasional Sermons and Speeches* and *Sermons on Theism, Atheism and the Popular Theology.*

Par'kersburg, W. VA., the county-seat of Wood co., 98 mi. s. w. of Wheeling, on the Ohio River, at the mouth of the Little Kanawha, and on the Baltimore & Ohio and other railroads. The city is in a fertile agricultural region and has a considerable trade. There are also oil and gas wells, coal mines, clay beds and several medicinal springs. The various industrial establishments include lumber mills, iron foundries, machine shops, chair and furniture factories, oil refineries, breweries, flour mills and other establishments. The city is regularly laid out from the water's edge of both rivers. A railroad bridge, one and one-third miles long, crosses the Ohio, and the city has a fine park and a public library. Some of the prominent structures are the Washington High School, the Academy of Visitation, Saint Joseph's Hospital, the Federal building, the courthouse and the city hall. Near the city is the island where Harman Blennerhasset once lived (See BLENNERHASSET, HARMAN). Parkersburg was settled in 1773 and was chartered as a city in 1863. Population in 1900, 11,703.

Park'hurst, CHARLES HENRY (1842–), an American clergyman, born in Massachusetts. He graduated from Amherst College at the age of twenty-four and later studied theology at Halle and Leipzig. He became pastor of the Congregational church at Lenox, Mass., in 1874 and in 1880 went to New York City, as pastor of the Madison Square Presbyterian Church. As president of the Society for the Prevention of Crime, he made a reputation as a social reformer. The investigations made by the society led to the appointing by the Senate, in 1894, of the Lexow Committee, which inquired into the work of the police department. The committee upheld the charges made by the society. Among the books which Parkhurst has published are *The Blind Man's Creed* and *Our Fight with Tammany.*

Park'man, FRANCIS (1823–1893), an American historian. He was born in Boston, graduated at Harvard in 1844, studied law for two years, traveled in Europe and returned to explore the Rocky Mountains. The hardships he endured among the Dakota indians seriously injured his health, yet in spite of this and defective sight, Parkman worked his way to recognition as an authority on the period of the rise and fall of French dominion in America. He paid seven visits to France to examine archives. Among his books are *California and the Oregon Trail*; *The Conspiracy of Pontiac*; *Pioneers of France in the New World*; *The Book of Roses*; *The Jesuits in North America*; *LaSalle and the Discovery of the Great West*; *The Old Régime in Canada*; *Count Frontenac and New France under Louis XIV*, and *Montcalm and Wolfe.* (See illustration on next page.)

Parlement, *pahr le maN'*, the name assumed by a number of local bodies in France prior to the Revolution. The most important was the Parlement of Paris, which was the result of a long evolution from a body which originated in the times of the earliest Frankish kings. There were others at many of the leading cities. The functions of the parlements were chiefly judicial, though they had a sort of legislative and administrative power, as well. Parlements became the center of opposition to the ruling kings and were especially influential in the reigns of Louis XI and Louis XIV. Louis XV abolished the Parlement of Paris and constituted a new and somewhat different body, but the old organization was revived under Louis XVI. The Parlement of Paris and the local parlements were all abolished by the National Assembly in 1790. Their historical importance lies in their influence upon later judiciary tribunals in France and throughout the world. They did much to summarize and unify the common law, and, in dispensing justice, were notably free from prejudice and party influence.

FRANCIS PARKMAN

Parliament, *pahr'ly ment,* an assembly of persons in conference upon public affairs; especially, the law-making branch of a government, and, specifically, the national assembly of the British nation, embracing two branches, the House of Lords and the House of Commons. The former is made up of two classes: (1) the *lords temporal,* comprising the hereditary peers and others from time to time created by the Crown; (2) the *lords spiritual,* or the clergy of the Anglican Church. The House of Commons consists of representatives of the whole people, chosen by districts. The sovereign is technically an element of Parliament, but in reality he exercises his right only in the signing and vetoing of bills. The authority of Parliament extends over the United Kingdom and all its possessions. See LEGISLATURE; GREAT BRITAIN, subhead *Government.*

Parliamen'tary Law, those rules by which most deliberative assemblies agree to be governed. Their purpose is to facilitate the transaction of business and the free and orderly discussion of questions. The chief duty of the presiding officer of an assembly is to preserve order and enforce the rules of debate and procedure by which the assembly is to be governed. The first principles of parliamentary law are that all business must be brought before the assembly through a *motion* or *resolution,* and that only one person has the right to speak at one time. The presiding officer usually recognizes the one who rises first, though it is within his discretion to recognize any other, for special reasons. It is usually customary to require a *second* to every important motion, in order to show that it has the support of more than one member. The motion is then stated by the chairman, and the maker of the motion has the right to speak in its behalf. The question is then thrown open for general discussion, and the general rule is that no other question can be considered while the first question is under discussion. However, there are certain classes of motions which take precedence of all others. The first class, called *subsidiary motions,* are used to suppress or postpone the discussion of a question. Among these is the motion to *lay the motion on the table,* that is, to postpone it until it can be taken up by the consent of the assembly. This motion cannot be debated. The second subsidiary motion is the request of the *previous question,* which stops all debate and orders the question submitted to a vote. The motion for the previous question requires two-thirds for its adoption. A third subsidiary motion is the motion to *postpone to a certain time.* The fourth subsidiary motion is to *commit,* that is, to refer to a committee. A motion may be *amended* by order of the assembly; this amendment may be amended, but the amendment of an amendment cannot be amended. Finally, a motion may be *postponed indefinitely.* There are also *incidental questions,* questions of appeal, objection and suspension of the rules, which require to be disposed of immediately upon their introduction. Finally, there are so-called *privileged questions*, including motions to fix a time for adjournment, to adjourn, to determine the rights of the assembly or of its members and to call for the regular order of business for the day. These take precedence in the order in which they are given above. All take precedence over any other question before the assembly. Voting is either by voice, those favoring a motion saying *aye* and those opposing it saying *no*; by a rising vote, or by ballot. The best manuals of rules of order are Robert's *Rules of Order* and Thomas B. Reed's *Rules of Order*.

Parma, *pahr'ma*, a city of northern Italy, capital of the Province of Parma, on the small river Parma, 72 mi. s. e. of Milan. It is almost circular in form and was formerly surrounded by a wall, the site of which is now occupied by promenades. Among the more important buildings are the cathedral, begun in the eleventh century; the baptistry; the Palazzo della Pilotta; a museum of antiquities, and a picture gallery, which contains famous works of Correggio and other great artists. The city is the seat of a university and of numerous other schools, technical, military and scientific. The manufactures, which are not of great importance, comprise, among other articles, musical instruments, felt hats, glass, tobacco, leather and iron ware. The chief trade is in wine, grain, cattle and cheese. Parma was originally an Etruscan town and became a Roman colony in the second century B. C. Population of the commune in 1901, 49,340.

Parnas'sus, a mountain of Greece, in Phocis. It has two prominent peaks, one of which was dedicated to the worship of Bacchus, the other to Apollo and the Muses. On the southern slope were situated Delphi, the Castalian fount and the Corycian caves, sacred to Pan and the Muses. The highest point is 8070 feet above sea level, and a magnificent view is obtained from the top.

Par'nell, CHARLES STEWART (1846–1891), an Irish statesman, born in the County of Wicklow, Ireland. He was educated at Cambridge, became a member of Parliament for Meath in 1875, organized the active Home Rule party and developed its obstruction tactics, and in 1879 formally adopted the policy of the newly-formed Land League, of which he was chosen president. In 1880 he was returned for the city of Cork and was chosen as leader of the Irish party. In the session of 1881 he opposed the Crimes Act and the Land Act, was arrested under the terms of the former, along with other members of his party, and was lodged for some months in Kilmainham jail. At the general election of 1885 he was reëlected for Cork, and in the next year he and his followers supported the Home Rule proposals introduced by Mr. Gladstone, while he also brought in a bill for the relief of Irish tenants. In 1887 he and other members of his party were accused by the *Times* newspaper of complicity with the crimes and outrages committed by the extreme section of the Irish Nationalist party. To investigate this charge, a commission was appointed by the government, with the result that, after a great deal of evidence was heard on both sides, a report was laid before Parliament which acquitted Parnell of all the graver charges. Parnell succeeded in collecting damages for libel from the *Times*. Shortly after this time he became involved in a scandal and lost his influence and the leadership of his party.

Par'ody, a humorous imitation of any poem. In its wider sense the word may be applied also to imitations of prose writings. Parody differs from burlesque and from travesty in that it deals with an entirely different subject from the poem imitated and resembles it only in form and expression. The following is the first stanza of Lewis Carroll's parody on Isaac Watts's well-known hymn:

"How doth the little crocodile
Improve his shining tail,
And pour the waters of the Nile
On every golden scale!"

Pa'ros, an island in the Grecian Archipelago, one of the Cyclades, 5 mi. w. of Naxos. Its greatest length is 15 miles, its greatest width 9 miles and its area about 96 square miles. The island is generally mountainous, but the soil, though often rocky, is fertile and in some places well cultivated. Corn, wine and oil are produced. Its marble has been famous from ancient times and is the material of which some of the most celebrated pieces of statuary are made. Parikia, a seaport on the northwest coast, is the chief village. Population of the island, 7740.

Par'rakeet' or **Par'roquet',** a group of parrots, characterized by their small size and long tail-feathers. They are found in southern Asia, on the coast of Africa and throughout the Australasian region. They have very bright, contrasting colors and make showy and intelligent pets. Some may be taught to speak with considerable distinctness. One species is found within the United States, where early in the nineteenth century this Carolina parrakeet found its way north as far as Nebraska, Wisconsin and central New York, sometimes remaining even into the winter; but because of its noisy habits and its tameness, it has been almost exterminated and now lives only in the wildest parts of the South.

Parrha'sius, a famous Grecian painter, one of the most noted artists of ancient times. He was born at Ephesus, and his father was an artist. The exact dates in the life of Parrhasius are not known, but he probably lived near the end of the fifth century B. C. It is said that he was the first to pay attention to accuracy of proportion in drawing and painting and also was the first to use light and shade to represent the contour and shape of objects. There is a myth which says that he once tortured a captive slave in order to secure a realistic reproduction of the sufferings of Prometheus. Among his famous paintings are *Athenian Democracy, Hermes, Ulysses Feigning Madness, Dionysus and Virtue* and many others.

Parroquet, *par'ro ket.* See PARRAKEET.

Par'rot, a name given to a group of climbing birds, of which there are about 350 species.

PARROT

They have hooked bills, rounded on all sides, which they use in climbing. Their legs are short and strong, and the toes are peculiarly arranged, two forward and two backward. Unlike those of most other birds, their tongues are soft and fleshy throughout their whole extent. The wings of parrots are moderate in size, but their tails are often elongated, and in some cases are used to assist in climbing. In plumage parrots are usually brilliant, and the colors are arranged in striking, and not always pleasing, contrasts. Parrots breed in hollow trees, feed on fruits and seeds and are known to live a great many years. There are instances on record of birds that have lived to be ninety years of age. There are several genera, variously known as parrots, parrakeets, macaws, lories and cockatoos.

The *green parrot* has an orange-colored bill, cheeks and chin, with a purple band over the forehead, but otherwise it is a shining green, except that its neck-feathers are edged with black. This bird comes from the tropical regions of South America and has become a favorite pet in the United States and in Europe, because it can be taught, not only to imitate various tones of the human voice, but also actually to speak words with some intelligence. *Lovebirds* are very pretty little parrots, about six inches long, famous for their affection for each other, which they manifest in various funny ways. See MACAW; COCKATOO.

Par'ry, WILLIAM EDWARD, Sir (1790–1855), a British explorer. He joined the navy in 1806 and remained in the service until 1852. In 1819, as commander of the *Griper* and the *Hecla,* he set out on his first northern journey, and during the succeeding nine years he commanded various expeditions in search of a northwest passage and the north pole. Parry reached latitude 82° 45′ N., and for forty-eight years this was the highest latitude reached.

Parsees or **Parsis,** *pahr'seez,* the name given in India to the fire-worshiping followers of Zoroaster, chiefly settled in Bombay and Surat and the vicinity, where they are among the most successful merchants. They have a great reverence for fire in all its forms, since they find in it the symbol of the good deity Ahurâ-Mazda (Ormuzd). To this divinity they have dedicated "fire temples," on whose altar the sacred flame is kept continually burning. Benevolence is the chief practical precept of their religion, and it is shown in their many charitable institutions. One of the most curious of their customs is in the disposal of their dead. They build, of stone, "towers of silence," about twenty-five feet high, with a small door to admit the corpse. Inside this tower is a large pit, with a raised circular platform round it, on which the body is exposed, that the flesh may be eaten by vultures, after which the bones drop through an iron grating into the pit below and are removed to a cavern. The Parsees never eat anything cooked by a person of another religion, neither do they marry persons not of their own caste and creed. The number of Parsees in India at the last census was 72,065.

Parsis, *pahr'seez.* See PARSEES.

Pars'ley, a plant native to Europe, but grown extensively throughout the United States. One species, the common parsley, is a well-known garden vegetable, used for seasoning and for decorating table dishes.

Pars'nip, a plant cultivated for its root, which is long, white and tapering. The roots are freely eaten by cattle and, when cooked, by man. The quality is improved by leaving the roots in the ground during the winter and digging them early in the spring. In the eastern part of the United States parsnips have run wild to such an extent that they have become troublesome weeds. Like many other species of the parsley family, the wild parsnip is slightly poisonous, and should not be eaten. However, it is probable that cases of fatal poisoning supposed to result from eating the wild parsnips are in reality caused by the water hemlock, a different plant, whose scientific name is *Cicuta maculata*. The roots of this latter plant resemble parsnips very strongly, and the plants themselves are sufficiently alike to deceive people who are not close observers.

Par'sons, KAN., a city in Labette co., 137 mi. s. by w. of Kansas City, on the Missouri, Kansas & Texas and the Saint Louis & San Francisco railroads. A large state hospital for the insane is located here, and the other prominent buildings are the Catholic church, a Y. M. C. A. building, the railroad depot, Rasbach Hotel, Masonic Temple, the business college and the high school. Glenwood and Forrest are fine parks. There are extensive natural gas wells in the vicinity, and sandstone and limestone quarries are in operation. The city has shops and general offices of the Missouri, Kansas & Texas railroad, flour and grist mills, elevators, a handle factory, a foundry, a creamery and other works. The place was laid out and incorporated in 1871. Population in 1905, 11,720.

Parson's Cause, THE, a famous lawsuit, in which Patrick Henry first gained fame as an orator. It arose over the attempt on the part of Virginia colony to pay the salaries of clergymen either in tobacco, as had always been done before, or in colonial money. As the price of tobacco was rapidly increasing, the loss to the clergymen through payment in colonial currency was important. They appealed to the king, who promptly vetoed the statute as unconstitutional. A clergyman, Rev. James Maury, thereupon sued for damages and won his cause before the court, but Patrick Henry, who was counsel for the defendant colony, in a remarkable speech in which he declared that Virginia could legislate in regard to her own affairs and denounced the intervention of the Crown, so moved the jury that they brought in an award of only one cent damages. This speech was one of the most important incidents in all the pre-Revolutionary struggle.

Par'thenon, a celebrated Grecian temple, built in the Age of Pericles, on the Acropolis at Athens; one of the finest monuments of ancient architecture and supposed to be the most perfect building ever erected. It is made of white marble, in the Doric style, and had originally eight columns on each of the two fronts, with seventeen columns on the sides. The length was 228 feet; breadth, 101 feet; height, to the apex of the pediments, 64 feet, and height of the columns, 34 feet. It was ornamented with large statues, and sculptures in relief, representing the chief events in the great religious festivals of the Greeks, in the life of Athena and in the history of Greece. The interior was divided into two rooms of unequal size, in the larger of which was the celebrated statue of Athena, made of gold and ivory, the work of Phidias. The Parthenon was dedicated to Pallas Athena (Minerva), and was the most sacred temple of the Athenians. In the Middle Ages it served as a Christian church and as a mosque, but in 1687 it was rendered useless for any such purpose by the explosion of a quantity of gunpowder which the Turks had placed in it during the siege of Athens by the Venetians. The more precious pieces of sculpture have been dispersed among various European collections, most of them being now in the British Museum. See ELGIN MARBLES.

Parthia, *pahr'the a,* in the widest sense, the Parthian Empire, lying between the Euphrates, the Oxus, the Caspian Sea and the Arabian Sea. In the narrowest sense, Parthia was the small country in Asia Minor formerly inhabited by the Parthians. The Parthians were of Scythian origin, fought only on horseback and were celebrated for their skill in archery. They were subject successively to Persians, Macedonians and Syrians, and they successfully resisted the Romans.

Part'nership, the association of two or more persons, for the purpose of undertaking and prosecuting conjointly any business, occupation or calling. Partnerships may be formed in three ways—(1) by written contract, (2) by oral agreement, (3) by implication, that is, by acts leading others reasonably to believe that a partnership exists. The duration of the partnership may be limited by the contract or agreement, or it may be left indefinite, subject to be dissolved by mutual consent, or by withdrawal of one member. It may also be dissolved by a court for various reasons. The members of a partnership are called *nominal* when they have not any actual interest in the trade or business, or its profits, but, by allowing their names to be used, hold themselves out to the world as apparently having an interest; *dormant*, or *silent*, when they are merely passive in the firm, in distinction to those who are active and conduct the business as principals, and who are known as *real*, or *ostensible*, partners.

A partnership may be limited to a particular transaction or branch of business, without comprehending all the adventures in which any one partner may embark, but such reservation must be specified in the contract. For in the usual course each member of a partnership is liable at common law for the debts of the firm, and a silent partner is responsible for all debts of the firm which have been contracted during his partnership. The powers of partners are very extensive, and the contract or other act of any member of the partnership in matters relating to the joint concern, is, in point of law, the contract or act of the whole and consequently binding upon the whole, to the extent of rendering each liable for it individually, as well as through his interest in the partnership property. This rule holds, even though the acts of one partner are fraudulent in relation to the others. Suits at law cannot be begun for or against the firm as a firm, but must be in the name of the partners individually.

Limited partnerships are authorized by some states, in which each partner is liable for the firm's debts only to the extent of his investment. See JOINT STOCK COMPANIES.

PARTRIDGE

Partridge, a name given rather loosely to a number of different birds of the grouse family. The common partridge of England is a handsome gray bird, with a dark chestnut horseshoe mark on the breast and broad reddish bars on the sides and flank. It is common almost all over Europe and feeds on grain and other seeds, insects and such pupae as are chiefly found in cultivated grounds. Like the quail, and unlike the true grouse, the partridges live in pairs. Their nest, which is circular and lined with grass, is placed among reeds, in hedges or in stubble, often near a road, and contains from nine to twenty eggs. In the United States the name partridge is applied to different birds in different localities. In the eastern states the ruffed grouse is called the partridge. In the southern states the quail, or "Bob White," takes the name.

Partridge, WILLIAM ORDWAY (1861–), an American sculptor, also distinguished as an art critic and lecturer. He was born in Paris, was educated at Columbia University, New York City, and later studied sculpture in Florence and Rome. His large bronze statue of Hamilton in New York City is now considered of first rank. In 1894 he completed the statue of Shakespeare which was unveiled at Lincoln Park, Chicago. Of his literary works the following are popular: *Art for America, The Technique of Sculpture* and *Song Life of a Sculptor*.

Partridge Berry, a pretty little trailing plant, with white or pink fragrant flowers and scarlet berries. The flowers are borne in pairs, and the fruits of the two grow together, making a single berry.

Pas'ade'na, CAL., a city in Los Angeles co., 10 mi. n. e. of Los Angeles, on the Southern Pacific, the Atchison, Topeka & Santa Fé and other railroads. The name is said by some to be of indian origin, signifying *the crown of the valley*, and by others to be from the Spanish, meaning *the threshold of Eden*. The city has a beautiful location at the head of the San Gabriel Valley, near the base of the Sierra Madre range, where the healthful climate has made it an attractive residence place and a popular winter resort. There are a number of large, fine hotels, including the Raymond, the Green, the Maryland and La Pintoresca. The city has a large public library, the Throop Polytechnic Institute and an Academy of Sciences possessing a valuable museum of archaeology and natural history. There are extensive parks and a fine new high school building. The industries include the cultivation of lemons, oranges and various other fruits, meat packing, fruit canning and manufacturing of woodwork, boots, shoes and brick. Pasadena was first settled by the Spaniards about 1771 and still contains some of their old houses. In 1874 a company from Indianapolis, Ind., began raising fruit there, and the city was incorporated in 1886. Population in 1900, 9117.

Pascal, *pa skahl',* Blaise (1623–1662), a French philosopher and mathematician, born at Clermont, in Auvergne. In 1647 he invented a calculating machine, and about the same time he made several discoveries concerning the equilibrium of fluids and the weight of the atmosphere. Among his well-known works are *Provincial Letters, Thoughts on Religion and Certain Other Subjects* and *Apology of the Christian Religion.*

Pasha, *pa shah',* in Turkey, an honorary title, originally bestowed on princes of the blood, but now conferred upon military and civil officials of high rank. There are three grades, originally distinguished by the number of horse tails waving from lances borne before them. Three horse tails were alloted to the highest dignitaries; two tails to the governors of important provinces, and one tail to minor provincial governors.

Passa'ic, N. J., a city in Passaic co., about 4 mi. s. e. of Paterson and 12 mi. n. w. of New York, on the Passaic River, at the head of navigation, and on the Lackawanna, the Erie and other railroads. It has a picturesque and healthful location, in the most fertile region of the state. Its city hall and other public buildings are fine structures, and it has a beautiful park. The Reid Memorial Library is one of the finest structures in the city. There are rubber and woolen mills, dye and print works, brickyards, chemical works, silk mills and other factories. In the vicinity are large vineyards, and considerable wine is manufactured. The municipal water supply comes from above the falls about four miles away. The place was settled about 1679, was incorporated as a village in 1869 and was chartered as a city in 1873. Population in 1905, 37,837.

Pas'samaquod'dy Bay, a bay opening out of the Bay of Fundy and lying between the State of Maine and New Brunswick. It is about 12 miles long and 6 miles wide and is dotted with small islands, which make a safe harbor for the town of Eastport.

Passenger Pigeon, *pij'un,* a wild bird which at one time abounded throughout the northern United States. It was about fifteen inches in length, with finely tinted plumage, small head and long wings. Its long tail was pointed in shape, the feathers growing shorter in regular order toward the edges. At one time these pigeons could be seen every spring in countless thousands, flying north to their summer nesting-places; but the hunters shot the birds as they were flying over and, following them to their roosts or nesting places, killed them in such vast numbers that now the species is practically extinct. The roosts or breeding places were sometimes many miles in length, and here the birds crowded together, hundreds having nests in a single tree. As late as 1876 the birds were quite numerous, and no more ruthless crime was ever committed against bird life than the extermination of the beautiful passenger pigeon.

PASSENGER PIGEON

Passengers. See Carrier, Common.

Passion, *pash'un,* **Flower,** a large genus of plants, native mostly of the warm regions of America. They are all twining plants, often spreading over trees to a considerable length, and in many cases they are most beautiful objects, on account of their large, rich or gaily-colored flowers, which are often succeeded by orange-colored edible fruits, for which indeed they are chiefly valued in the countries where they grow wild. They received their name from the early Spanish missionaries, who believed that they saw in the beautiful flowers emblems of the crucifixion of Christ. On account of their beauty, many of the species are cultivated in hothouses or even out of doors in mild climates. See Flowers, *color plate,* Fig. 11.

Passion Play, a kind of mystery play which originated in the Middle Ages, founded on the incidents of the Old and New Testament and on legends connected with the lives of the saints. The earliest plays were in Latin and were played by the priests, but in the fourteenth century they were first written in the dialects of the people and acted by the people in England, France, Germany and Italy, where they became very popular. Later on, the nature of the plays changed and they fell into disfavor, because of the buffoonery and coarseness which were introduced into them. In the eighteenth century they took place only in Bavaria, and even here King Max Joseph forbade their performance, making an exception in the case of the Oberammergau Passion Play. In 1633 the inhabitants of Oberammergau, a little village in the Bavarian highlands, as an act of gratitude because they had escaped a plague which was causing much desolation, vowed that they would perform every tenth year a play representing the passion of Christ. Ever since, the play has been performed regularly every ten years and has attracted visitors from all parts of the world. There are about six hundred performers, all villagers, who play their parts with religious fervor and reverence. The part of Christ is taken by the man of their number who is the most deserving of this great honor.

Pass′over, the principal Jewish festival, instituted to commemorate the providential escape of the Hebrews in Egypt, when God, smiting the first-born of the Egyptians, *passed over* the houses of the Israelites which were marked with the blood of the paschal lamb. It was celebrated on the first full moon of the spring, from the 14th to the 21st of Nisan, the first month of the sacred year. During the eight days of the feast the Israelites were permitted to eat only unleavened bread; hence the Passover was also called the "feast of unleavened bread." On the first evening, every householder, with his family, ate a lamb killed by the priest, which was served up without breaking the bones. If the family was too small to eat the entire lamb, neighbors were called in to partake of the feast. The history of the deliverance was read by the head of the house, and psalms were sung.

Pass′port, a warrant granted by a government to its citizens who wish to travel abroad. It consists of a declaration of citizenship and permission to leave the country granting the passport. In some states no foreigner is allowed to travel without a passport from his government, and in all cases the visitor to the continent of Europe is wiser to provide himself with one, if only as a means of identification. In Russia and Turkey, in particular, a passport is indispensable. In the United States, passports are issued by the state department at Washington. They are good for two years from date, renewable by stating the date and number of the old one. The fee required is one dollar.

Pasteur, *pas tör′*, LOUIS (1822–1895), a French chemist and physicist, born at Dole, Jura, educated at Jena University and at the Ecole Normale, Paris, where in 1847 he took his degree as doctor. In 1867 he became professor of chemistry at the Sorbonne and in 1882 was chosen a member of the French Academy. He was especially successful in his efforts to check hydrophobia, by means of inoculation (See HYDROPHOBIA).

LOUIS PASTEUR

It is said that a German manufacturer of chemicals noticed that impure nitrate of lime fermented when dissolved and exposed in the sun, and that this prompted Pasteur to an investigation, the result of which was the discovery of a living germ comparable in its powers to the yeast plant. He then went on to show that other fermentations—lactic, butyric, acetic—are essentially due to organisms, and that putrefaction is also due to the same cause (See FERMENTATION; PUTREFACTION). This path of investigation enabled him to make important practical suggestions in regard to the making of vinegar and the prevention of wine disease. Pasteur next (1865) directed his inquiries to those diseases of silkworms by which the silk industry in France had been almost ruined. It is said that he had never before even seen a silkworm, though he knew the supposed disease germs which had been demonstrated by previous investigations in the insect's blood. These he traced from egg to larva, from chrysalis to moth; and as the disease is distinctly manifest in the adults, though it may be hidden in the young, the practical conclusion was plain that unhealthy moths should be rejected and that all precautions should be taken to prevent infection. But Pasteur's work on the diseases of silkworms was too heavy for him, and in 1868 he was afflicted with paralysis. Soon, however, he was at work again, investigating beer, as he had investigated wine, and here he detected the intruders which sometimes interfere with the life of the yeast plant and spoil the brew. His researches began to come yet closer to human life, for he attacked the problem of splenic fever, the bacillus of which had been discovered by Davaine and skilfully traced from stage to stage by Koch. Of Pasteur's investigations in this connection, that by which he showed that birds were not liable to fall victims to splenic fever, because the temperature of their blood is too high for the prosperity of the germ, may serve as a characteristic illustration. After 1886 the center of his work was the Pasteur Institute in Paris.

Pas'toral Poetry, poetry which deals, in a more or less direct form, with rustic life. It has generally flourished in highly corrupt, artificial states of society. Thus it was that Theocritus, the first pastoral poet, made artistic protest against the licentiousness of Syracuse, and that Vergil wrote his *Bucolics* and *Eclogues* in the corrupt Roman court. In the sixteenth century pastoral poetry received its most notable expression in the *Arcadia* of G. Sannazaro, the *Aminta* of Tasso and the *Faithful Shepherd* of Guarini. This tendency, which was so potent in Italy, spread to England and influenced the *Shepherd's Calendar* of Spenser, the *Arcadia* of Sidney, the *Faithful Shepherdess* of Fletcher, the *As You Like It* of Shakespeare and the *Comus* of Milton. The *Gentle Shepherd* of Allan Ramsay (1725) was the last successful dramatic pastoral.

Pat'ago'nia, the name formerly applied to that extreme portion of South America which is bounded on the e. by the Atlantic, on the w. by the Pacific, on the s. by the Strait of Magellan and on the n. by the thirty-eighth parallel of south latitude. Since 1881 this large territory has been, by treaty, divided between Chile and the Argentine Republic, so that the portion west of the Andes belongs now to the former, and the portion east of the Andes to the latter. The vegetation is scanty, except in the region adjoining the Andes, and in many places there are shallow salt lakes and lagoons. There are few, if any, good seaports. The Patagonians are a tall, muscular race, with black hair, thick lips and skin of a dark brown color. They are a nomad race, divided into numerous tribes, whose chief occupations are hunting and cattle breeding. This native population, however, never numerous, is rapidly disappearing. Colonization is encouraged by the Argentine government, and there are many tracts suitable for European settlement. The country was first discovered by Magellan in 1520.

Patchouli, *pa choo'ly,* a perfume obtained from the dried leaves and branches of a plant of the mint family, found in India and China, where it is cultivated on a large scale. It is used in India to scent costly Cashmere shawls, tobacco and hair oil, and it is everywhere valued as a preservative of woolens and linens from insects.

Pat'ent, a privilege from government, conveying to the individual or individuals specified, the sole right to make, use or dispose of some new invention or discovery for a certain limited period. Before the Declaration of Independence patents were occasionally issued by the colonial governments; and the Constitution of the United States expressly vested in Congress power "to promote the progress of science and the useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." The Congress of 1790 passed an act regulating the issue of patents for inventions, which remained practically unchanged till 1836. During this time patents were granted with little discrimination. By the law of 1836 Congress repealed former acts and established a new system which still remains in force.

Application is made to the commissioner of patents in a prescribed form, containing a petition, and an oath that the applicant believes himself to be the first inventor. This is accompanied by a minute description of the invention, with drawings or models, if conditions require and permit them. This application is investigated by a special examiner, and if found novel and useful, a patent is granted for seventeen years, except in case of a design patent, which may run for three and a half, seven or fourteen years. The fees are $15 with the application and $20 with the grant. The Patent Office is attached to the department of the interior. The office publishes pamphlets on *The Patent Laws and*

Laws Relating to the Registration of Trade-marks and Labels and *The Rules of Practice in the United States Patent Office*, which may be had on application. The number of patents issued in the United States greatly exceeds that of any other country. In 1840 the number was 449; in 1850 it was 973; in 1870 it was 12,677; in 1900 it was 22,935 and in 1904 it was 30,934. The total number issued to Dec. 31, 1904, was 788,790.

Patent Office. See PATENT.

Pat'erson, N. J., the county-seat of Passaic co. and the third city of the state in population and industries, is situated on the Passaic River, 12 mi. n. of Newark and 17 mi. n. w. of New York, and on the Erie, the New York, Susquehanna & Western and the Delaware, Lackawanna & Western railroads. It is also connected with several adjoining towns by electric lines and with the Delaware River by the Morris Canal. The city is built upon a broad plain and the surrounding hills, on a curve in the river, and covers an area of about 8½ square miles. The streets are broad, well graded and well paved. The river at this point has a perpendicular fall of 50 feet, and within a short distance below the falls, a descent of 20 feet, affording exceptional water power. The gorge in the river is spanned by a number of bridges. There is a park along each side of the falls, and on a hill near by is a fine soldiers' monument. The important buildings include the city hall, the courthouse, the postoffice and a number of business blocks. Among the charitable institutions are the Paterson General Hospital, Saint Joseph's Hospital, Old Ladies' Home and Children's Nursery. The city is the leading silk-manufacturing city of the United States. Other important industries include the manufacture of locomotives, steel trusses and bridge work, iron and steel products, brass, machinery, cotton goods, thread, paper, jute and malt liquors.

The city was founded in 1791 by an organization of which Alexander Hamilton was one of the leaders. It was incorporated as a city in 1851. Its growth has been steady and permanent. Population in 1905, 111,529.

Paterson, WILLIAM (1658–1719), a British financier, born in Dumfriesshire, Scotland. He went through England as a peddler, settled for a time at Bristol and later lived in the Bahama Islands. Returning to London, he engaged in trade with success, and in 1694 he proposed and founded the Bank of England, of which he was one of the first directors.

Paterson, WILLIAM (1745–1806), an American statesman and jurist, probably born at sea. He came to America at an early age, graduated at Princeton (then the College of New Jersey), and was admitted to the bar in 1769. He was a delegate to the Continental Congress in 1780, and as a member of the Federal constitutional convention he offered the famous New Jersey, or "Small State," plan to the convention, providing for a single legislative house, in which each state should have one vote, an executive council, subject to removal by Congress, and a Supreme Court, elected by Congress. He served in the United States Senate,was governor of New Jersey, and from 1793 until his death was associate justice of the United States Supreme Court.

Pathology, *path ol'o jy.* See MEDICINE.

Patience, *pa'shens.* See SOLITAIRE.

Pat'more, COVENTRY KEARSEY DIGHTON (1823–1896), an English poet. His first publications were a volume of poems and a number of critical articles in great reviews of his day. His verse includes *The Angel in the House*, *The Unknown Eros and Other Odes* and *Poems*. While often melodious and in passages beautiful, his poems are for the most part trivial, and it is somewhat difficult to understand the high rank which was given him by his contemporaries.

Pat'mos, an island off the coast of Asia Minor, 20 mi. s. of Samos. It is a part of Turkey. Its length is about 10 miles, its breadth, nearly 6. The island is an irregular mass of barren rock; agricultural products are scanty, and the inhabitants find their chief occupation in fishing. The island is famous as the supposed place to which Saint John was exiled. Population, about 4000.

Pat'na, a city of British India, in the district of Bengal, on the Ganges, 285 mi. n. w. of Calcutta. It extends for 9 miles along the river, and its tombs, mosques and monuments present a fine appearance when seen from the river. Its streets, however, are narrow and dirty, and its buildings are of little interest. At the western side of the city is the suburb of Bankipur, where the government offices and European residences are situated. By reason of its central position and natural advantages, the city is an important business center, and it is the chief seat of the opium trade. Population in 1901, 135,172.

Pa'ton, JOSEPH NOEL, Sir (1821–1901), a Scottish historical painter, born at Dunfermline. He exhibited his first picture, *Ruth Gleaning*, at Edinburgh in 1844. He produced many pictures, among which are *The Pursuit of Pleasure*, *Home* (a soldier's return from the Crimea), *In*

Memoriam (a scene from the relief of Lucknow), *Faith and Reason, Light in Darkness* and *The Man with the Muck Rake.* He also published two volumes of verse and was a sculptor of some ability.

Patrae, *pah'tre.* See PATRAS.

Patras, *pah'tras,* or **Patrae,** a seaport of Greece, situated on the Gulf of Patras, 13 mi. s. w. of Lepanto. The town is well built and has wide streets and numerous arcades. It contains an old citadel and the remains of a Roman aqueduct, and has modern fortifications. It is a commercial center and exports large quantities of currants, also wine, oil and skins. During the Middle Ages it was the chief commercial center of Greece. Population in 1896, 37,958.

Patriarchs, *pa'tre ahrks,* a name given to the heads of families living before the Flood and to the three fathers of the Hebrew race, Abraham, Isaac and Jacob. The term is also applied to the twelve sons of Jacob, and at a later period it became the title of the presidents of the sanhedrin, which exercised a general authority over the Jews of Syria and Persia after the destruction of Jerusalem. From them the title was adopted by the Christians, who applied it, from the beginning of the fifth century, to the bishops of Rome, Constantinople, Alexandria, Antioch and Jerusalem. The patriarch of Rome became the supreme pontiff of the West, the four heads of the Eastern Church preserving the title of patriarch. The patriarch of Constantinople is the primate of the Greek Church in the Ottoman Empire.

Pat'rick, SAINT (396–469), the apostle of Ireland, born in the British-Roman province of Valentia, probably at Nemthur on the Clyde, where Dumbarton now is. After being ordained a bishop and receiving the papal benediction from Celestine I, he went over to Ireland about the year 405. Here he is said to have founded over three hundred sixty churches, baptized with his own hand more than twelve thousand persons and ordained a great number of priests. "He found no Christians and left no heathen." Among the many marvelous legends which have clung to his name is that which declares that he drove the snakes from Ireland.

Pa'trons of Husbandry. See GRANGE.

Patroon' System, the plan adopted by the Dutch West India Company for the colonization of New Netherlands, by which any member of the company could gain possession of a tract of land 16 miles along any river and of indefinite depth, by planting a colony of 50 persons in the province. The proprietor also had absolute power over the colony which he established, and he was known as the *patroon.* The evil effect of this system was soon apparent, and it was gradually changed, so as to remove some of its most objectionable features, but many of the estates thus created endured well into the nineteenth century. See VAN RENSSELAER, STEPHEN.

Pat'terson, ELIZABETH (1785–1879), the wife of Jerome Bonaparte. Napoleon excluded Jerome from his dynasty, and threatened him with imprisonment unless he consented to repudiate his wife. In 1805 Jerome and his wife embarked for Europe, where she was not permitted to land. Madame Bonaparte sought refuge in England, where her son, Jerome Napoleon Bonaparte, was born. Later she returned to Baltimore, and Napoleon induced the Council of State to declare the marriage void. In 1815 Madame Bonaparte herself procured a divorce. She left a fortune of $1,500,000 to her grandsons, Jerome Napoleon Bonaparte, now in the French army, and Charles Joseph Bonaparte, who was made secretary of the navy during Roosevelt's second term.

Patti, *pat'ee,* ADELINA MARIA CLORINDA (1843–), a soprano vocalist, born at Madrid. She received her musical training from her brother-in-law, Maurice Strakosch, made her first appearance in New York in 1859 as Lucia

ADELINA PATTI

and in 1861 made a brilliant début at Covent Garden, London, in several famous rôles. Afterward she fully established her reputation as an artiste in the chief cities of America and Europe. In 1868 she married the marquis de Caux, from whom in 1883 she obtained a divorce. Subsequently she married Signor Nicolini, after whose death she was married to Baron Cederström.

Pat′tison, Robert Emory (1850–1904), an American politician, born in Somerset County, Md. He was taken in infancy to Philadelphia, where he received an elementary education and was admitted to the bar in 1872. Though a Democrat in a strongly Republican city, he was elected comptroller in 1877 and was reëlected in spite of tremendous opposition. In 1882 he was nominated for governor and elected, being the first Democrat to hold that office in Pennsylvania in thirty years. He was again elected governor in 1890, and during both terms he served the state with ability and energy.

Pau, *po,* a town of France, capital of the Department of Basses-Pyrénées, picturesquely situated on a height above the right bank of the Gave de Pau, in view of the Pyrenees. The most interesting building of the city is the castle of Henry IV, which has recently been restored. Pau is a favorite winter resort, as it has a mild, dry climate, with a peculiarly still atmosphere and no sudden variations in temperature. The manufactures comprise linens, cutlery, chocolate and wine. Population in 1901, 34,268.

Paul, the apostle, commonly called Saint Paul, was born of Jewish parents at Tarsus, in Cilicia. He went to Jerusalem to study under Gamaliel, one of the most celebrated Jewish rabbis. Thus prepared for the office of teacher, he joined the sect of the Pharisees and became a persecutor of the Christians. He was present at and encouraged the stoning of Stephen, and it was only when he was overtaken by a vision on his way to Damascus that he became a convert to Christianity. Arabia, Syria, Asia Minor, Greece and the islands of the Mediterranean were the scenes of his labors. The churches of Philippi in Macedonia, of Corinth, Galatia and Thessalonica honored him as their founder; and he wrote epistles to these churches and to the churches in the chief cities of Greece and Asia Minor. He went to Jerusalem and was there arrested and brought to Caesarea, where he was kept a prisoner for two years by the Roman governors Festus and Felix. He appealed, as a Roman citizen, to the emperor; and on his way to Rome, where he arrived in the year 62, he was shipwrecked on the island of Melita. According to the tradition of the early Church, he suffered martyrdom during the reign of Nero.

Paul, the name of five popes. Paul I, pope 757–767, brother of Stephen II, was on good terms with Pippin and Charlemagne. Paul II, pope 1464–1471, caused a crusade to be preached against the Hussites. Paul III, pope 1534–1549, formerly Alessandro Farnese, was a zealous defender of the Church and did much to suppress heresy. Among the important events of his reign were the publication of a brief condemning slavery, the excommunication of Henry VIII of England, the approval of the Order of Jesuits and the convocation of the Council of Trent. He was a great patron of art and appointed Michelangelo architect in chief of the Vatican and Saint Peter's. Paul IV, pope 1555–1559, joined France in the war for the conquest of Naples (1555–1557). Paul V, pope 1605–1621, laid an interdict on Venice and established the Congregation of the Oratory and of the Ursuline and Visitation.

Paul I (1754–1801), emperor of Russia, son of Peter III and Catharine the Great. On the death of Catharine, in 1796, he succeeded to the throne. He put an end to the war with Persia and liberated the Poles who were in confinement in Russia. He joined the coalition against France, but afterward favored the cause of Napoleon and laid an embargo on all British ships in the Russian ports. He was put to death by conspirators.

Paul′ding, James Kirke (1779–1860), an American miscellaneous writer, born in Pleasant Valley, N. Y. He removed to New York, where he became intimately acquainted with Washington Irving and published, with him, a series of humorous and satirical essays, entitled *Salmagundi.* For some years he was secretary of the United States navy. He published several novels, among which are *Koningsmarke* and *The Dutchman's Fireside*; a *Life of Washington,* many political pamphlets and some poems.

Paul′ists, the common name of a priestly order, organized for the purpose of doing missionary work in the United States. The correct designation of the order, which was founded in 1858, is The Congregation of Missionary Priests of Saint Paul the Apostle. They have a magnificent church in New York City, which is also the central home of the order. A large proportion of its members are converts from Protestantism, and they make a special effort to spread their faith among the non-Catholic citizens of the United States. *The Catholic World* is their monthly publication.

Pauncefote, *pawns'fut,* JULIAN, Lord (1828–1902), an English statesman and diplomat, born at Munich, Germany, educated at Paris and Geneva. He was admitted to the bar in 1852. In 1866 he was appointed attorney-general at Hong Kong and acted as judge of the supreme court in 1869 and again in 1872. He was knighted in 1874, and two years later he became undersecretary of foreign affairs. In 1888 he was appointed as British minister at Washington, and in 1893 he was raised to the rank of ambassador. His greatest diplomatic success was the completion, with Secretary Hay, of the treaty relating to the construction of a trans-isthmian canal. He always used his influence to promote a friendly feeling between the United States and Great Britain. See HAY, JOHN; HAY-PAUNCEFOTE TREATY.

Pauperism, *paw'pur iz'm,* the condition of persons who are dependent upon public aid for support. This problem has been treated differently by different countries and at different times. The problem was not presented to the nations of antiquity, since extreme poverty was comparatively rare among them. During the Middle Ages pauperism was attended to chiefly by the Church, which taught that alms-giving and charity were essential to the obtaining of grace. At the beginning of the modern period, the State began to assume the control of relief for the poor, first through the cities and later through the general government. To-day, in Catholic countries, pauperism is generally relieved through Church agencies, but the State supports certain charitable institutions, such as hospitals and homes. In Germany there is a combination of public and private charity, administered by trained inspectors, who investigate cases individually and thoroughly. In Italy, there is little control of pauperism beyond that exercised by the Church. In England, State aid to the poor has been carried to extreme conclusions. Taxes are levied for the purpose, and the proceeds are administered by local boards, which are responsible to the general local government board of England. Workhouses, special schools, hospitals and other philanthropic institutions are supported by this means. In the United States, poor relief is recognized as a public duty, but it is usually cared for by the smaller, or local, units of government; in the large cities, by municipal governments, and elsewhere, by the county governments. There has been a rapid growth in the number of institutions for the care of pauper invalids and criminals.

Pavement, a floor or covering of stone, wood, brick or asphalt, laid on the ground so as to make a hard, smooth surface, fit for a roadway. Pavements were in use in ancient times, though their origin is obscure. The streets of Babylon are said to have been paved in 2000 B. C. According to Livy, Rome was paved as early as 170 B. C. and pavements of lava have been found in the excavations of the old Roman cities of Pompeii and Herculaneum. In the Middle Ages pavements were not common until the twelfth century, and from that time to the nineteenth century they were rudely constructed, large cobblestones being generally used. Of modern cities, Paris is said to have been the first paved; now at least a part of the streets in all cities of Europe and America have pavements.

Stone pavement is the most durable, and this is used for the business streets of large cities. Granite, which is the most suitable stone, is made into rectangular blocks, which are laid on the narrow side, on a foundation of concrete, and are set close together in rows, across the street. Such pavements are very expensive and are used only in the streets where a great amount of heavy traffic is done.

Brick pavement is of bricks made especially for the purpose, being so hard-burned that they have a glassy appearance. They are laid on a foundation of sand, gravel or tarred planks, in a manner similar to that of the granite blocks in a stone pavement. This pavement is used extensively in the Western United States.

Wooden pavement is made of cylindrical blocks about six inches long, laid so that the ends of the blocks form the surface. The foundation of boards is covered with hot coal tar; the blocks are then set on end in contact, the spaces between being filled with sand or gravel, and the surface covered with a coating of hot tar. This pavement is now little used, because it wears unevenly and decays rapidly.

Asphalt pavement is made by spreading a coating of sand and asphalt two or three inches deep on a solid foundation, then rolling it with a heavy roller. These pavements are very durable, the wear compacting the material instead of grinding it away. It is noiseless; is easily cleaned and has been used extensively in the United States, especially in the residence streets, where heavy traffic is uncommon.

Pavia, *pah ve′a,* a city of Italy, capital of the Province of Pavia, on the left bank of the Ticino, 19 mi. s. of Milan. It is still partly surrounded by old walls and fortifications. Among the principal buildings are the cathedral, begun in the fifteenth century and never finished; the Church of San Michele, the castle now used as barracks, and the university, which is one of the oldest in Europe and was during the Middle Ages one of the most famous. The manufactures of the town are unimportant, and the trade consists largely in silk, olives, wine and Parmesan cheese. Pavia was a place of considerable importance under the early Roman emperors. It afterward came into the possession of the Lombard kings, who made it their capital, and later it was under the Milanese. Population in 1901, 27,424.

Pawn′brokers, persons who lend money on the security of goods *pledged* or deposited with them. Although this mode of borrowing is occasionally taken advantage of by all classes, and bankers, when they accept security for their advances, act on the same principle as the pawnbroker, the business, as a special one, originates chiefly in the necessities of the poor, who, by depositing an article of personal property, can secure the use of a small sum of money for a short period at a comparatively high rate of interest. On the European continent this form of borrowing is partly conducted by charitable institutions called *Monts de Piété.* The business is regulated by statutes in most of the states.

Pawnee′, once a large tribe of indians living in what is now Nebraska and Kansas, whence they often went south and west on expeditions across the plains. They were a strong, hardy race, always at war with their neighbors, and early became skilled horsemen. The remnants of the tribe are now scattered upon reservations in Oklahoma.

Pawpaw′. See PAPAW.

Pawtuck′et, R. I., a city in Providence co., 4 mi. n. of the business center of Providence, on the Blackstone River, on the Pawtucket River at the head of navigation and on the New York, New Haven & Hartford and several electric railroads. It is an important manufacturing city, producing cotton, silk and woolen goods, plush, velvet, machinery, foundry products, gymnastic apparatus, electrical supplies and various other articles. The Blackstone River has a fall of fifty feet and furnishes considerable water power. The city covers an area of about nine square miles and contains Doggett Park, Collyer Monument, a soldiers' monument and several interesting bridges of various kinds. Some of the prominent buildings are the Sayles Memorial Library, a home for the aged poor, Emergency Hospital and a state armory. The place was settled about 1654. That part on the east side of the river was originally in Bristol co., Mass., but came into the possession of Rhode Island in 1862. The city was incorporated in 1886. The first cotton mill in the United States was established here in 1790 and is still standing. Population in 1900, 43,381.

Pax′ton, JOSEPH, Sir (1801–1865), a landscape gardener and architect, born in Bedfordshire. He became gardener and latterly was estate manager to the duke of Devonshire, at Chatsworth, in Derbyshire. His design of the Crystal Palace for the great International Exhibition, London, in 1851, gained him great popularity, and soon after he was knighted. He was elected member of Parliament for Coventry in 1854 and continued to represent it until his death.

Payne, JOHN HOWARD (1791–1852), an American actor and dramatist, best known for his song, *Home, Sweet Home.* He was born in New York, where, at thirteen, while a merchant's clerk, he proved his remarkable precocity by editing the weekly *Thespian Mirror.* His father's

JOHN HOWARD PAYNE

bankruptcy forced him to leave Union College after two years' attendance, and in 1809 he began to support the family by acting. He won great applause in the chief American cities and in London, where he supported himself until 1832 by adapting foreign plays and writing original ones. His lack of business ability kept him always poor. He served as consul at Tunis, Africa, from 1842 to 1845 and again from 1851 until his death. In 1883 his body was removed to Washington, D.C. His famous song, with music adapted from an old Italian melody, was first sung in his opera, *Clari*, at London in 1823.

Payne, SERENO ELISHA (1843–), an American politician, born at Hamilton, N. Y., educated at the University of Rochester and admitted to the bar in 1866. He began the practice of law in Auburn in the same year, was elected district attorney of Cayuga County in 1873, was chosen to Congress in 1883, was reelected two years later and continuously from 1889 to 1909. During his later terms he was acknowledged leader of the Republican majority in the House of Representatives.

Pea, *pee,* a genus of plants belonging to the leguminosae, or pulse family, and usually characterized by long, slender stems, smooth leaves and a fruit consisting of round seeds enclosed in a pod. There are many varieties of pea, ranging from the short dwarf pea that grows but a few inches high, to those whose vines are of such length that they cover poles from eight to ten feet in height. Peas are extensively raised in all the cooler regions of the northern hemisphere, since they form valuable food for man and domestic animals. For feeding stock they are usually allowed to ripen, then are dried and ground, either with other grains or alone. For table purposes in the United States, they are used green more extensively than in any other way, and in the northern part of Wisconsin and some other localities, the raising and canning of green peas is an important industry.

Pea'body, MASS., a town in Essex co., 2 mi. w. of Salem, on the Boston & Maine railroad. It has the Peabody Institute, with a large library, established by George Peabody, and the Sutton Reference Library. The county agricultural society has its headquarters here, and Emerson Park is of interest. There are extensive manufactures of leather, morocco, shoes, gloves, machinery, thermometers, electrical supplies, hardware and other articles. It was a part of Salem and later of Danvers, and it became a separate town in 1855. The present name was adopted in honor of George Peabody in 1868. Population in 1905, including several villages, 13,098.

Peabody, GEORGE (1795–1869), an American merchant and philanthropist, born at Danvers, Mass. (now Peabody). At the age of seventeen, he went to Georgetown, D. C., where he engaged in the dry goods business. He served for a time in the War of 1812 and removed to Baltimore in 1815, where his business expanded to such an extent that branches were established in New York and Philadelphia. Later he founded the firm of George Peabody & Company in London and lived there until his death, always maintaining, however, an active interest in the United States. He made many gifts for philanthropic and educational purposes, of which the most important were $200,000 to found the Peabody Institute and Library in his native town, $150,000 each to Yale and Harvard, $140,000 to the Peabody Academy of Sciences at Salem, Mass., $10,000 to assist the United States Sanitary Commission during the Civil War, $1,250,000 to found the Peabody Institute, Library, Art Gallery and Conservatory at Baltimore, $2,500,000 for the construction of lodging houses in London and $3,000,000 to form a Peabody Educational Fund to promote education in the Southern states (See PEABODY EDUCATIONAL FUND).

Peabody, SELIM HOBART (1829–1903), an American educator, born at Rockingham, Vermont. He was educated at the University of Vermont and became professor of mathematics and engineering in the Polytechnic College at Philadelphia. Later he occupied a number of educational positions in the West, and in 1878 he became professor of mechanical engineering at the Illinois Industrial Academy at Champaign. In 1880 he was made president of this institution, which during his administration became the University of Illinois. He retained the position until 1891, when he was chosen chief of the department of liberal arts for the World's Columbian Exposition.

Peabody Educational Fund, a fund bequeathed in 1867 and 1869 by George Peabody for the purpose of aiding education in the South. The fund consisted of securities amounting to $3,100,000, but $1,384,000 of this was in bonds of some of the Southern states, which, because of the Civil War, were repudiated. The fund is under the management of a board of trustees, who select an agent as their executive officer. It is the duty of this agent to recommend the use to which the income from the funds should be put. According to the provisions of the donor, after the first two years the principal was to remain without division for thirty years, at the expiration of which time it could be used in such way as the trustees should decide. Nearly all of the income from the fund has been applied to aiding schools established for the training of teachers. According to the regulations of the trustees, a school having 100 pupils and complying with their requirements may receive $300. If it has 200 pupils it may receive $600, and if it has 300 pupils, $1000. Many scholarships, varying in value from $100 to $200, have been granted to worthy students. At the close of the thirty years, about $2,600,000 had been paid out, and the fund was in excellent condition. Most of the money has been expended in the Southern states and applied to the education of both white and colored students. See SLATER FUND.

Peace Conference, INTERNATIONAL, a congress of delegates of the chief nations of the world, assembled at The Hague, Holland, on May 18, 1899, at the request of Czar Nicholas II of Russia. On Aug. 24, 1898, he caused a note to be sent to the foreign diplomats at Saint Petersburg, pointing out the necessity of a general convention for discussing the maintenance of peace throughout the world and the general disarmament of nations.

Steps were at once taken by the various governments to appoint representatives to the conference, which met, by the invitation of Queen Wilhelmina of The Netherlands, at The Hague. When it assembled, May 18, 1899, the nations represented were the six great European powers and eight smaller European states, four Asiatic governments, China, Japan, Persia and Siam, and the United States and Mexico. The conference immediately appointed committees and sub-committees, who went into secret session to receive various propositions upon the particular line of work each was to consider. The general conference met every few days to hear and discuss the reports of these committees. On the 29th of July the congress was brought to a close.

In regard to disarmament the delegates contented themselves with a declaration of the desirability of an arrest in the increase of the armaments. They also signed resolutions referring the question of the rights of neutrals and private property and of bombardment to a future conference and urging a reduction in the military and naval budgets. The rest of their work consisted of three declarations, against (1) the use of balloons for dropping explosives; (2) the use of shells which give forth deadly gases; (3) the use of bullets which expand when they strike the human body. The American and English delegates declined to sign the second and third clauses of this agreement. The powers, besides, signed three "conventions," one of which applied the humane provisions of the Geneva Convention to naval warfare (See GENEVA CONVENTION). Another embodies a perfected code of the rules of war (See INTERNATIONAL LAW).

This last, the great achievement of the conference, makes mediation an international duty and provides for the establishment of a permanent court of arbitration with a bureau at The Hague. It also makes it the duty of all governments to encourage the submission of disputes to the court and provides for the elaboration of a complete code of arbitration procedure. This convention was in the form of a treaty and was ratified by the United States Senate Feb. 5, 1900. The permanent court is to consist of four representatives of each of the powers, though the same person may represent more than one power. The term of service is six years, and a member may be reappointed. Unless the parties agree differently, arbitrators for a dispute are to be chosen from this board, two by each party, these to chose a fifth, known as the umpire.

At a second conference, held in 1907, forty-five nations were represented. This conference adopted thirteen conventions which tend to strengthen the work of international arbitration.

Peach, a fruit closely allied to the plum and cherry. The peach is one of the most delicious fruits of temperate climates. It is cultivated more extensively in the United States than in any other country. Its range is from the Gulf of Mexico to southern New England and the shores of Lake Ontario and Lake Michigan.

The tree is small, rarely exceeding twenty-five feet in height, and has small, willow-shaped leaves. The blossoms appear in early spring, before the leaves, and are a light pink or a pale blue. The fruit has a fuzzy skin and contains a rough, hard pit or stone. When ripe the fruit becomes a soft, fleshy drupe. There are many varieties of peach under cultivation, but all are grouped under two classes, *freestones* and *clingstones*. In the former the fleshy part of the fruit when ripe separates from the pit or stone, while in the latter it does not. The peach thrives best in a warm temperate climate, with numerous sunny days, and it prefers a light, sandy soil.

The growing trees are usually set in rows about twenty feet apart. The fruit is picked a little before it is ripe. It is usually packed in small baskets and is common in all American markets from August to October. It is eaten raw, preserved, dried and canned. Next to the apple, the peach is the most important American orchard fruit. The leading states in its production are Michigan, Georgia, Texas, California, New York, Delaware, New Jersey and Illinois. California produces the largest quantity, and Michigan ranks second. See FRUITS, *color plate*, Fig. 14.

Pea'cock, the male of the pea fowl, a large pheasant, of which only two species are known.

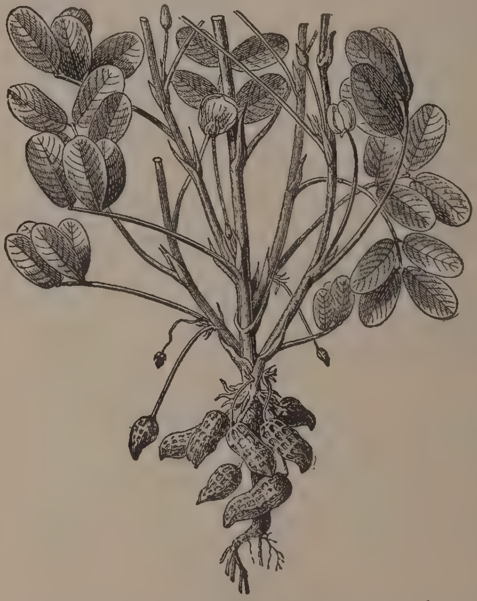
PEACOCK

The male is remarkable chiefly because of his brilliant plumage and the enormously long feathers that cover his tail and form a beautiful train, which may be erected and spread out into a gorgeous fan. The feathers of the peacock have been so long used for ornament that they are well known to every one, and history shows that the bird was kept by the Hebrews and early Greeks, among whom and the Romans it was used in banquets as a table fowl. It will live in almost any climate with a little care, but the young are delicate and hard to rear, so that the numbers do not increase rapidly. The female is much smaller, has no train and is dull of plumage. The *Javanese peacock* is the second species and almost equals in beauty the one described.

Peale, CHARLES WILSON (1741–1827), an American painter and writer, born at Chesterton, Md. He studied under Copley in Boston and also under Benjamin West in London. He returned to America in 1774 and soon settled in Philadelphia. He is best known by his portraits of famous Revolutionary soldiers and statesmen. Among them are fourteen portraits of Washington, one of which, ordered by Lafayette, now hangs in the National Institute at Paris. He also painted notable portraits of Benjamin Lincoln, Nathaniel Greene, Count de Rochambeau, Horatio Gates, Baron de Kalb and several later statesmen. Many of his portraits now hang in Independence Hall, Philadelphia. Before his death he painted *Christ Healing the Sick*, which is one of his few works upon subjects other than portraits.

Peale, REMBRANDT (1778–1860), an American artist, born in Bucks co., Pa. When seventeen years old he executed a portrait of Washington, which was purchased by Congress in 1823, and other portraits of eminent men. He was president of the American Academy and one of the original members of the Academy of Design. Among his well-known pictures are *The Roman Daughter, The Court of Death* and *The Ascent of Elijah.*

Pea'nut or **Goo'ber,** the fruit of a small vine of the pea family. When the flower falls, the stalk supporting the undeveloped pod



PEANUT

lengthens and, bending downward, pushes the fruit into the ground, where it grows and ripens. The peanut is cultivated in most of the Southern states and in the Eastern states as far north as southern Indiana. It is sometimes known as the *groundnut*. In the United States the annual crop amounts to more than 12,000,000 bushels, the greater part of which comes from Florida, Georgia, North Carolina and Virginia. Peanuts are roasted and eaten as a delicacy, and they form the basis of many of the modern health foods. An oil used in making salads and as an ingredient of soaps is expressed from the seeds.

Pear, *pair,* a fruit closely related to the apple. It grows wild in many parts of Europe and Asia, and from the wild pear the numerous cultivated varieties have originated. The tree in its general appearance closely resembles the apple tree, but does not grow as large. The fruit in its structure resembles the apple, but in shape it is irregularly conical, with the base of the cone hanging downward. When ripe, the pulp is soft, sweetish and pleasing in flavor. In certain varieties, however, the fruit is hard and crisp. The pear is propagated by grafting (See GRAFTING). The scions are usually grafted to wild pear stock, but they may be grafted to the quince and the white thorn. This fruit is extensively cultivated in France, in the northern part of Italy and in the United States in California, New York, Michigan, Oregon and Washington. The choicest fruit is obtained from California and Oregon. The fruit is picked while green and is allowed to ripen slowly; otherwise, it decays before fully ripe. Pears are used as they come from the trees and are also canned and dried.

Pea Ridge, BATTLE OF, a battle of the Civil War, fought at Pea Ridge, Arkansas, March 7 and 8, 1862, between a force of 10,500 Federals, under General S. R. Curtis, and a Confederate force of about 14,000, under Price, McCulloch, Van Dorn and Pike. Curtis advanced against Price, who was at Springfield, Mo., and Price retired, being joined by the other Confederate forces. They then attempted to strike the Federal army in the rear and compel its surrender. The attack was at first successful, but it finally resulted in a fearful slaughter without important gains, and Van Dorn, who was in chief command, ordered a retreat. The Federal loss was about 1400; that of the Confederates, probably more than 1000. The battle resulted in saving Missouri to the Union cause.

Pearl, *purl,* a small, roundish body, found in the shells of certain mollusks, such as oysters. Pearls are secreted by the mantle of the animal. They are caused by the presence of some irritating body, as a grain of sand. The pearl is formed by a secretion which hardens over the sand and makes it less irritating, and if this projection breaks loose and becomes rounded or pear-shaped, it is valued as a pearl for jewelry. Pearls are not found in all oysters, and perfect ones are of rare occurrence. In color they are white, black or pink, and they reflect the light in a beautiful play of colors.

The most valuable pearls come from the large oyster found most abundantly in the Persian Gulf and off the west coast of Mexico. In the Persian Gulf the fishing is done from a boat, which is accompanied by five pairs of native divers. One goes to the bottom, pulled down by a heavy weight which he carries. His partner watches from the boat the cord attached to the diver; at the proper signal the man in the boat draws up the weight, then the oysters and lastly the diver. The oysters are carried to the shore and laid in piles, where they remain until they become thoroughly decomposed; then they are thrown into sea water and carefully examined for pearls, while the shells are cleaned and split into layers for the mother-of-pearl which they contain.

The pearl fisheries of Ceylon are a government monopoly, but the revenue derived from them is not a regular one, the fishery sometimes failing for years in succession. There was no fishery, for example, between 1837 and 1854 or between 1863 and 1874. The pearl oyster occurs throughout the Pacific. Very fine pearls are obtained from the Sulu Archipelago, northeast of Borneo. Of late years pearl fishing has been started with considerable success in Australian seas; and it is carried on also in the Gulf of Mexico, upon the coast of California and in the vicinity of Panama.

Pearls have formed valued articles of decoration and ornament from the earliest times. Julius Caesar presented Servilia, the mother of Marcus Brutus, with a pearl valued in modern computation at $240,000, while Cleopatra was said to have swallowed one gem valued at $300,000 or $400,000. The "Pilgrim" pearl of Moscow is diaphanous in character and weighs 24 carats.

Artificial pearls are largely made in France, Germany and Italy. They are very well imitated by the scales of certain fishes. A substitute for black pearls is found in close-grained hematite, not too highly polished, and pink pearls are imitated by turning small spheres out of the rosy part of the conch shell.

Pearl Ash. See POTASH.

Pearl River, a river of Mississippi, which rises in the northern part of Winston County and runs southwestward to the city of Jackson, thence southeastward, forming a part of the southeastern boundary of Louisiana. It flows into the Gulf of Mexico. Its length is about 350 miles.

Peary, *pee ry,* ROBERT EDWIN (1856–), an American naval officer and Arctic explorer, born at Cresson, Pa., and educated at Bowdoin College. In 1881 he became a civil engineer in the United States navy and was given the rank of commander. Since 1888 Commander Peary has spent most of his time in the Arctic regions. The most noted results of his expeditions are the following: determining that Greenland is an island; the discovery of Melville Land and Heilprin Land beyond Greenland; the rounding of the Greenland Archipelago, the last great land group to be explored. His crowning achievement was reaching the North Pole on April 21, 1909. Peary is recognized as the foremost Arctic explorer of his time. His scientific achievements have been as important as his discoveries of unknown regions. He has been awarded several medals by American and foreign geographical societies and has been made an honorary member of the leading scientific associations in all parts of the world. See NORTH POLAR EXPLORATION.

Peasants', *pez'ants,* **War,** a great insurrectionary movement among the peasantry, which in 1525 spread over the whole of Germany. The immediate cause of this movement was religious fanaticism, but the forces by which it was impelled grew out of the long course of oppression to which feudal customs had subjected the people. The peasants had thought that Luther would aid them in their rising, but he was determined to keep the religious movement free from political complications, and worked rather against, than for, the peasants. The rising was put down, and almost one hundred thousand peasants were put to death as a punishment.

Peat, *peet,* a sort of turf extensively used in some regions as a fuel. It is composed principally of dead mosses, but it often contains small twigs and even tree trunks that have fallen and have been kept from rotting. The mosses began to grow many centuries ago and continued branching and intermingling till they formed close woven mats, which killed the lower parts of the stems. As the moss died below, it continued to grow above. These mosses thrive only in wet places; hence in the course of centuries the areas known as *peat bogs* have been formed. When thoroughly dried, peat burns with considerable heat and but little smoke. For centuries it has been extensively used for fuel in Ireland and Scotland, where it is found in large quantities. The simplest method of preparing it for fuel is to dig the peat from the bog and cut it into brick-shaped blocks, which are set up to dry. In some localities the peat is ground and purified from the earth and clay by washing. The prepared peat is then run into beds about four inches deep and allowed to dry partially, when it is cut into blocks about four inches square and twelve inches long. These are then stacked and allowed to become thoroughly dry. In this form peat makes an excellent fuel, but its preparation renders it somewhat expensive. See COAL; FUEL.

Pecan', a species of hickory, growing in North America and cultivated especially in California and in the Southern states, for the nut. The nut is oblong and has a thin shell. The variety called the *paper shell pecan* has a very thin shell and is the most desirable. The tree is large, with hard, very tough wood and with catkins of small flowers. Texas and Louisiana produce most of the pecans of commerce. See HICKORY.

Pec'cary, a genus of animals, nearly allied to the swine. One species, the *collared peccary,* about three feet long, occurs abundantly in South America and also in North America, living generally in small flocks. Their food consists of mace, potatoes, sugar cane and similar materials, and cultivated fields suffer much from their raids. The other species, called *white-lipped,* is larger and is found only in South America. The flesh is savory and is coarser and stronger than pork.

Peckham, *pek'am,* RUFUS WILLIAM (1838–), an American jurist, born at Albany, N. Y. His father was a well-known New York jurist and member of the court of appeals of the state. The son was educated at Albany Academy and at Philadelphia and was admitted to the bar in 1859. In 1868 he became district attorney of Albany County, later corporation counsel of the city of Albany and in 1883 was chosen to the supreme court of the state. Three years later he was elected associate judge of the court of appeals and in 1895 was appointed associate justice of the United States Supreme Court by President Cleveland.

Pecos, *pa'kos,* **River,** a river of New Mexico and Texas, which rises in the Rocky Mountains in San Miguel co., N. M., runs in a southeasterly direction and, after a total course of about 800 miles, flows into the Rio Grande. During the hottest weather it is almost dry.

Pedagogics, *ped a goj'iks,* or **Pedagogy,** *ped'a go jy,* the science and art of teaching. The term is derived from *pedagogue,* which comes from a Greek word meaning *a leader of children.* The Greek pedagogue was a slave who acted as the attendant and protector of a child. Later the Romans applied the term to the slave who taught the child Greek. From this the significance of the term was transferred to one who teaches. *Pedagogics* has a narrower application than education; the term applies only to the principles and theories of education, whereas *education* pertains not only to the application of these principles and theories, but also to the establishing of whatever measures and systems may be necessary for this purpose. "Pedagogy, so to speak, is the theory of education, and education the practice of pedagogy."

The laws of psychology form the rules of teaching; consequently, pedagogy is a derived science and is based on psychology. For this reason the study of psychology should precede the study of pedagogy. Since the principles of teaching apply to all phases of instruction, pedagogy is also related more or less directly to all sciences found in courses of study. It relates to biology and physiology, in physical education; to logic, mathematics and the natural sciences, in intellectual education, and to history, literature and ethics, in moral education.

In the article EDUCATION, HISTORY OF, an account is given of the general trend of the various educational movements from ancient to modern times, and in this discussion of pedagogics the successive methods employed are given attention.

While all educational systems, even the most ancient, contain some valuable principles, those established previous to the Christian era have so little bearing upon modern theories and methods that their consideration is not necessary in a brief account.

I. THE HUMANISTS. *The Early Christian Fathers.* The period of the Humanists extends from the founding of Christianity through the Middle Ages. Their theories and principles were the result of their purposes and ideals. Christianity set up new standards of life and revolutionized the thought of its followers. The purpose of education among the early Christians was to be able to interpret the Scriptures and to explain the subtlest truths of their religious belief. Education was consequently placed under the care of the Church, and the early Christian fathers were the first educators under this system. With few exceptions, religion, and reading and writing in Greek or Hebrew were the only subjects taught. Most of the leaders in the Church proscribed Latin and Greek authors, as their literature was that of the pagan world. The methods of instruction were dictatorial and arbitrary. Pupils were taught words before things, and were compelled to give unquestioned acceptance to the statements of their teachers. Independent thought or original investigation was not permitted. While some of these early teachers admitted the Latin and Greek classics, the same methods of instruction were employed by all.

The Schoolmen. The age of the Fathers was followed by that of the Schoolmen, and to this period most of the education of the Middle Ages belongs. During the greater part of the period, three systems of education were running parallel. These were monastic education, knightly education and secular education. Each of these systems was in marked contrast to the others. By the seventeenth century, monasteries were scattered through all the countries that had composed the Roman Empire. The prejudice against pagan writers had disappeared, and the educational work of these schools was much broader than at the beginning of the era. The course of instruction embraced the seven liberal arts, which were divided into two classes, the *trivium* and the *quadrivium.* The first included Latin grammar, logic and rhetoric; the second, arithmetic, geometry, astronomy and music. Reading and writing were included under grammar. The completion of the course required seven years; all secular studies were pursued with reference to their interest to the Church, and the Latin language was taught, to the universal neglect of the mother tongue. Later, logic absorbed the attention of the Schoolmen, who applied it to the development of theology. This produced a class of scholars who were noted for their ability to develop abstract theories and for their skill in reasoning on abstruse points of theology. Their system of education and methods of instruction tended to withdraw these men from the world and abnormally to develop the memory and reason at the expense of the other mental powers. The educational system of the Schoolmen was unbalanced, but its methods became so firmly established that they have had a molding influence on the educational systems and theories of all succeeding centuries, and the great schools of some monastic orders, particularly the Benedictines, were at that time the leading educational institutions of the world.

Knightly education was the direct opposite of monastic. Its purpose was to fit the youth for the world. He was trained for war and the chase, to be truthful and to reverence women. He ignored the literature of Greece and Rome, but became reasonably conversant with his native language and dwelt upon the works of nature as the source of the noblest sentiments and purest joys. His inspiration was the love of glory, and his ideal, the knightly hero. Knightly education had a modifying influence on succeeding systems.

The secular education of the town or burgher schools had its origin in the necessities arising from the industrial conditions of the age. It was the practical education of its time and gave special attention to the reading and writing of the mother tongue, and to arithmetic, geography and history. In some schools, music and Latin were also added. These schools were under the supervision of the Church, and the methods of instruction were similar to those employed in the monastic schools; their course of study became, under the skilful direction of John Sturm, the foundation of that graded system of instruction that shaped the schools of Germany, England and America for three hundred years.

The Humanists based their system on the works and teachings of those who had preceded them in both the Christian and pagan world. While they infused the spirit of Christianity into much of their work and were inspired by lofty ideals of the relation between man and God, the supreme importance which they attached to the scriptures and their religious tenets made their instruction dogmatic. They also exalted words over things, stifled the spirit of free inquiry, gave undue prominence to formal reasoning and made learning a process of memorizing. Humanistic education failed to secure the development of all the powers of man.

II. The Realists. The methods and theories of the Realists are in marked contrast to those of the Humanists. This school of thinkers and educational reformers may be said to begin with the ascendency of Lord Francis Bacon (See Bacon, Francis). Bacon is credited with being the originator of inductive philosophy (See Induction; Inductive Method), in which inquiry, observation and experiment were substituted for the dictum of authority. Bacon's method is clearly illustrated in the following extract from Oscar Browning's *History of Educational Theories*: "The lock was to be opened; that was the problem. Other philosophers had tried key after key, each more complicated than the other. Bacon said, take the lock to pieces and examine its mechanism, and you will then be able to make a key which will open it." Bacon not only organized a new method of interrogating nature, but he also reclassified the sciences, showing the degree of progress which each had made, and their relation to one another. He was the first to classify pedagogics, or the science of education, as a department of psychology.

While Bacon's system of reasoning was opposed by the Schoolmen, it was welcomed by a class of vigorous thinkers who arose during the early part of the seventeenth century. These men applied Bacon's doctrine to education and promulgated theories which in time caused a strong reaction against the abstract education of the Humanists.

Ratich. The first of these reformers of note in the educational world was Wolfgang Ratke, or Ratich. He was a theorist, rather than a practical reformer, and did not succeed in establishing his theories or in modifying the educational system of his country; yet his aphorisms contain a number of principles which lie at the foundation of the most widely accepted theories of the present day.

John Amos Comenius. Comenius, a Moravian bishop, was a more vigorous and practical reformer than Ratich and may be considered the founder of modern methods of instruction. He was the first who successfully applied Bacon's method of inquiry to the instruction of children. The first reform instituted by Comenius was in the teaching of languages. This he accomplished through his book *Janua Linguarum Reserata* (The Gate of Tongues Unlocked) which appeared in 1631. This book possessed the following points of merit, (1) It was adapted to the pupil's capacity, (2) the lessons were carefully graded, (3) it taught things in connection with words. This work was translated into all the leading languages of Europe and also into Arabic and one of the languages of India. It revolutionized the methods for teaching language wherever it went. In 1658 an enlarged and revised edition appeared under the title of *Orbis Sensualium Pictus* (The Illustrated World of Sensible Objects), in which all the objects named were accompanied by pictures. This was the first illustrated text-book in the world and was for many years the most popular text-book of Europe; its introduction was the beginning of systematic training of the powers of observation. (See Comenius, John Amos.)

Comenius also gave careful study to the organization of school systems, as well as to methods of instruction, and worked out a plan of graded instruction, based upon his theories, more complete than that instituted by Sturm. It included four grades of instruction, beginning with the home life of a child, where he was first trained by the mother, and extending to the university. According to this system, the child was to receive an elementary initiation into all studies. Moreover, the mental powers were to be trained in the order of their natural development, namely, observation, memory, imagination and reason. The following principles gleaned from the writings of Comenius will be recognized as constituting the basis of the most generally accepted educational theories of modern times:

"(1) Education is the development of the whole man. (2) Educational methods should follow the order of nature. (3) Both sexes should receive equal instruction. (4) Learning should be made agreeable. (5) There should be an easy gradation in studies. (6) Things naturally connected in themselves should be joined together in teaching. (7) Studies should be adapted to the capacity of the pupil. (8) Nothing is to be learned by heart that is not first thoroughly understood. (9) Words should be learned in connection with things. (10) The concrete should precede the abstract; the simple, the complex; the nearer, the more remote. (11) Things to be done should be learned by doing them."

These principles entitle Comenius to rank as one of the greatest educational reformers of the world. His system and methods aimed at the development of the whole man, but he was far in advance of his time. The thought of the seventeenth century was so strongly wedded to that of the sixteenth, that so radical a change as that which he proposed could be accomplished only in a long term of years.

The conflict between the Humanists and Realists, which began in the seventeenth century, was handed down to the eighteenth and has been transmitted to successive generations, but with a constant convergence of the fundamental ideas in the two systems; and the beginning of the twentieth century saw a wise selection of the best in each, all blended and harmonized, in the most advanced educational systems of the world.

III. The New Education. *Beginnings.* The eighteenth century was one of discontent; it was characterized by radical changes in political, religious and educational thought. During the century there was continual controversy between the Humanists and the Realists and, with scarcely an exception, the Humanists were in supreme control of public education, but their methods were to some extent modified by the works of Comenius. Various reformers arose who added much to educational progress. This was done more by their reiterating the principles of Comenius and placing them before the people in a new light and more attractive form, than by adding anything really new in the way of principles and theories. The three most celebrated reformers of this period were Locke, Rousseau and Pestalozzi, all living during the latter half of the century, and Pestalozzi doing his most effective work during the first quarter of the century that followed.

John Locke (See Locke, John) considered that the mind at birth was like a sheet of blank paper, upon which ideas were to be impressed as they were acquired. He gave special attention to physical education and was the originator of the aphorism, "a sound mind in a sound body." He followed Comenius in his idea of teaching the mother tongue before other languages and laid special stress on moral and religious training.

Rousseau (See Rousseau, Jean Jacques) was the great educational theorist of his age, and his treatise, *Emile*, was the most influential work of the century. Appearing in 1762, just as the Jesuits were driven from France, and written in an attractive style, it gained wide attention and was instrumental in molding public opinion. Rousseau bases his theory upon two fundamental principles, (1) nature is to be studied and followed; (2) education is an unbroken unity, extending from early childhood to maturity. He follows the method of observation instituted by Comenius and advocates manual training. *Emile* occupies an important place in the study of pedagogics, more on account of its influence than for any new principles which it contained.

Pestalozzi (See Pestalozzi, Johann Heinrich) is the reformer to whom the educational progress of the nineteenth century owes the greatest debt. In both Catholic and Protestant countries great efforts had been made toward the development of popular instruction, but the public schools were nevertheless in a wretched condition. Domestics, discharged soldiers, corrupt artisans, degraded students and other grossly unfit persons were employed as teachers. To Pestalozzi, more than to any one else, is due the reform which has given us the primary school as found in Germany and the United States to-day. With the acceptance of Pestalozzi's principles and theories, the "new education" may be said to have fairly begun, though a long time has been required for its general extension to the public schools of Europe and America. As summarized by Dr. Payne, in *Painter's History of Education,* the principles of Pestalozzi, briefly stated, are:

(1) The principles of education are sought in human nature. (2) This nature is organic, consisting of physical, intellectual and moral capabilities, ready and struggling to develop themselves. (3) The function of the educator is both negative and positive. He must remove impediments to the learner's development, and he must also stimulate the exercise of his powers. (4) Self-development begins with sensations received through the senses. These sensations lead to perceptions which, registered in the mind as conceptions or ideas, constitute the basis of knowledge. (5) Spontaneity and self-activity are the necessary conditions under which the mind educates itself and gains power and independence. (6) Practical aptness depends more on exercise than on knowledge. "Knowing and doing must, however, proceed together. The chief aim of education is the development of the learner's powers." (7) All education must be based on the learner's own observation; . . . "this is the true basis of all knowledge." (8) What the learner has gained by his own observation has become an actual possession, which he can explain or describe in his own words. (9) The learner's growth necessitates advancement from the near and actual to the more remote; hence, from the concrete to the abstract, from particulars to generals, from the known to the unknown.

Principles and Phases. All these principles are embraced in the "new education," and the pedagogical movements of the last half of the nineteenth century have been along the line of their application. Attempts to solve the problems of education have been very generally studied under the following phases:

1. Child Study. The study of children from a physiological, as well as a psychological, point of view has been prosecuted in Germany and the United States with a high degree of success. Much valuable information has been collected on the rapidity of growth in different years, the condition of the senses as to normal development and the relation of defective senses to the mental development of the child. The maximum rate and precision of voluntary movement have been tested in thousands of children, and the results have been taken into consideration in the teaching of drawing, writing and oral reading. Endurance and fatigue, aptitudes and interests, the contents of children's minds, the scope of the memory at different ages, the rapidity of improvement in different children of the same age and many other conditions bearing directly or indirectly upon instruction in the elementary school have been determined and placed before the teachers for their guidance.

2. The Subject-Matter of Education. This subject has been the cause of contention between the Humanists, who have placed great stress upon the ancient classics, and the Realists, who consider such subjects as the natural sciences, modern languages and history as the most important. During the last half of the nineteenth century, the more practical subjects have rapidly gained ground in American and German colleges and universities, and the present tendency is to grant them precedence over Latin and Greek. This subject has also caused a great deal of discussion concerning the methods of elementary instruction; these are generally known as the concentric and the historical methods. According to the concentric method, the child is taught only a few central facts in the primary grade, and these are expanded and added to from year to year as his mental development increases. The historical method proceeds on the assumption that the child, during his mental development, passes through substantially the same stages as the race has passed through in reaching its present stage of civilization. These stages are known as culture epochs; and all subjects containing a human element, such as history and literature, should be arranged to conform to these various culture epochs. The leading advocates of the historical method are the German educators Ziller and Herbart, and they have found a large following in Germany and the United States.

3. Coördination and Correlation of Studies. These terms mean, respectively, deciding what

studies shall be given equal rank in a course of study, and what studies are naturally related to one another. The solution of this problem is largely dependent upon the theory of instruction adopted, and its discussion in the United States is of quite recent origin. It is agreed that such an association of studies as leads each to reinforce the others enhances the pupil's interest in his work, gives him a better understanding of the subjects and strengthens his power of volition. Those who believe moral culture to be the greatest aim of education consider such studies as history and literature of first importance; those who accept the idea of the philosophical unity of knowledge as a basis for coördination place the various branches of natural science, ethnology, anthropology and history as the central, or knowledge, subjects; while others consider that there are independent coördinate groups of studies, and that the subjects of each group should be correlated according to their natural relations.

4. Methods of Teaching. The dependence of methods of instruction in elementary schools upon the laws of psychology is now universally recognized, and more attention is given to the professional training of teachers than ever before (See NORMAL SCHOOL). This result has been brought about very largely through child study and the study of experimental psychology. The trained teacher understands that instruction is limited by the knowledge, aptitude and interest of the pupils, and that methods of instruction must meet these conditions. The multiplication of normal schools, the establishing of departments of pedagogy in many of the leading colleges and universities of the United States and the unprecedented growth of pedagogical literature during the last quarter of the nineteenth century are evidence of the general interest in education and of progress in perfecting the public school systems of the country. See EDUCATION; PSYCHOLOGY; CHILD STUDY; METHODS OF TEACHING; COMMON SCHOOLS.

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Pedee′, GREAT, a river of North Carolina and South Carolina, known in part of its course as the Yadkin. It rises in North Carolina and flows south and southwestward and enters the Atlantic Ocean through Wynyaw Bay. The Little Pedee, its most important tributary, rises in North Carolina and flows southward and enters the Great Pedee about 40 miles above its mouth.

Ped′iment, in classic architecture, the triangular mass resembling a gable, above the entablature at the end of buildings or over porticoes. The pediment is surrounded by a cornice, and is often ornamented with rich sculpture. In the architecture of the Middle Ages small gables and triangular decorations over doors, windows, niches, façades and other parts of buildings are called pediments. The finest examples of pediments are to be seen in the Parthenon at Athens and in the temples of Aegina and Olympia.

Pedom′eter, an instrument like a watch, carried in the pocket. It is so constructed that the motion of the body causes a lever to move every time the bearer steps. Before a person can tell the distance he has walked, he must measure the distance covered by a certain number of steps, and from this he must determine the average length of his step. The pedometer registers the number of steps taken. See CYCLOMETER.

Pe′dro II (Portuguese pron., *pa′dro*), (1825-1891), emperor of Brazil, succeeded to the throne on the abdication of his father, Pedro I, in 1831. Brazil prospered greatly under the rule of Pedro II, who did much to develop its resources in every direction. In 1871 he issued an imperial decree for the gradual abolition of slavery, which totally ceased in Brazil in 1888. He made several visits to Europe, and was deposed by the revolution of November, 1889.

Peeks′kill, N. Y., a village in Westchester co., 40 mi. n. of New York City, on the east bank of the Hudson River, just below the highlands, and on the New York Central railroad. It contains extensive manufactures of stoves, fire brick, hats, underwear, foundry products and other articles. The place was settled in 1764 and was named in honor of Jans Peek, an early Dutch navigator. Near the village is the famous Robinson House, where generals Israel Putnam and Samuel H. Parsons made their headquarters in 1778–1779, and where Benedict Arnold in 1780 first heard of the capture of Major John André. Population in 1905, 13,200.

Peel, Robert, Sir (1788–1850), a British statesman, educated at Harrow and at Oxford. After entering Parliament in 1809, he was appointed undersecretary for war and the colonies and later was made chief secretary for Ireland. His attitude toward the Irish question brought him into conflict with O'Connell and the extreme Catholic party, and a duel between him and O'Connell was narrowly averted. He established the Irish constabulary while in this office and later established the London police force, which took from him the names of "Peelers" and "Bobbies." He was returned to Parliament in 1817 from Oxford, but some years later his changed views on the Catholic emancipation question led to his defeat. In 1834 and in 1841, Peel was prime minister, and during his second term in that office he changed from a Conservative and supporter of protection to a free trader. He also gave his support to a repeal of the Corn Laws.

Peer, in general, signifies an equal, one of the same rank and station. In this sense it is used by the common law of England, which declares that every person is to be tried by his peers. Peer also signifies in Britain a member of one of the five degrees of nobility that constitute the *peerage* (duke, marquis, earl, viscount, baron), or, more strictly, a member of the House of Lords.

Peg'asus, in classical mythology, a winged horse, formed by Neptune from the drops of blood which fell from Medusa's head as Perseus flew with it over the sea. This beautiful steed was the favorite mount of Apollo and the Muses. Bellerophon captured Pegasus and with his aid put to death the chimera.

Pei-ho, *pa'ho'* or *pi'ho'*, a river of China, which rises near the Great Wall, n. of Peking, flows southeast and empties into the Gulf of Pe-chi-li. Its total course is about 350 miles, 100 of which are navigable. At its mouth is the small town of Taku.

Peipus, *pi'poos*, a lake of Russia, surrounded by the governments of Saint Petersburg, Esthonia Livonia and Pskov. It is about 75 miles in length and 32 miles in width, and has low, sandy banks, which are in most places wooded. It discharges itself by the Narova into the Gulf of Finland. It is well supplied with fish.

Pe'kin, Ill., the county-seat of Tazewell co., 10 mi. s. of Peoria, on the Illinois River and on the Illinois Central, the Atchison, Topeka & Santa Fé, the Chicago & Alton, the Cleveland, Cincinnati, Chicago & Saint Louis and several other railroads. The city is an important railroad center, in a fertile agricultural district, near productive coal mines. There are manufactures of agricultural implements, wagons, beet sugar, glucose, alcohol, fertilizers and lumber, foundry and clay products. It has a free library and good school buildings. The place was settled in 1829 and was incorporated in 1850. Population in 1900, 8420.

Pe'king', the capital of the Chinese Empire, is situated in the Province of Chi-li, between the Pei-ho and the Hun-ho rivers, 100 mi. from the mouth of the river, at the Gulf of Pe-chi-li. It is at the head of the Grand Canal and about 50 mi. s. of the Great Wall of China. The city is surrounded by high walls, which are entered by sixteen gates. The outer wall is 30 feet high, 25 feet thick at the base and 12 feet at the top, with square towers at intervals of about 180 feet, rising to a height of 50 feet and projecting outward in the form of buttresses. The circuit of the walls is about 30 miles. The city is divided by a wall, extending east and west, into two parts, known as the Tartar, or Inner City, which occupies the northern portion of the site, and the Chinese, or Outer City. The wall of the Inner City is 40 feet high, 62 feet thick at the base and 34 feet at the top.

The Chinese City is the newer portion and was built during the thirteenth century. It contains the greater part of the population and is the business portion of the Chinese capital. Among its important buildings is the Altar of Heaven, with its surrounding temples and shrines; the Temple of Heaven, in which the emperor at midnight in the winter solstice offers sacrifices, and the Temple of Agriculture, near which, each spring, the emperor plows one or more furrows to inaugurate the opening of the season. The streets in this part of the city are lined with shops, which contain wares of almost every description.

The Imperial City, or Tartar City, is entered through gates in the wall dividing it from the Chinese City, also through gates in the northern wall. Within this part of the city are found the buildings of the foreign legations, which, since the Boxer outbreak in 1900, have been strongly fortified. The Tartar City contains three enclosures, concentrically arranged. The outer enclosure is occupied by the general populace. The second, which is separated from the first by a wall, contains the government offices, temples, parks and an artificial lake on the west. In the center of this enclosure, known as the Imperial City, is the Purple, or Forbidden City, which is the residence of the emperor and his immediate family and the highest officials. This area is considered sacred and is closed to foreigners, except for special missions. It contains the imperial palace, pleasure grounds, pavilions and reception halls. The walls of this enclosure, together with the roofs of all the buildings, are covered with yellow tiling.

The industries of Peking are almost entirely related to the government, only such commercial and manufacturing enterprises being carried on within the city as are necessary to supply the wants of its population. The administration of the great Empire brings together a large number of officials and their families. It is at Peking that the government examinations are conducted, and the examination hall has cells, or small rooms, sufficient to accommodate 10,000 students at a time. The Imperial University and Imperial Observatory are also located here. The city contains many Buddhistic temples and churches of a number of Christian missions, also mission schools. While the streets are reasonably broad, only a few of them are paved. Carriages and teams are seldom seen, and transportation is either by small, covered carts or by sedan chairs. Since the occupation of the city by foreign troops in 1900, considerable progress has been made in improving the streets and the sanitary condition.

Peking has been settled for so many centuries that it is not known when it began. It was made one of the capitals by the Khitan Tartars in 937 and was named Nanking, or the Southern Capital. In 1264 Kubla Khan made it his capital and built the present Tartar City, which was the Kambalu of Marco Polo. It was occupied by the Manchus in 1643 and since then has been somewhat improved. It had never been entered by foreign troops until 1900, when the allied forces took possession of the city and raised the siege of the foreign legations. This occupation continued until September, 1901. The city is connected by telegraph with the important centers of the world, and in 1897 rail connection was established between it and Tien-tsin, later with Mukden and thence with Europe, through the Trans-Siberian railway. Population, estimated at 1,300,000.

Pelas′gians, a prehistoric race, widely spread over the whole of Greece, the coasts and islands of the Aegean and Asia Minor and Italy.

Pelee, *pa la′*, MONT. See MARTINIQUE.

Pelew, *pe loo′*, **Islands** or **Palau,** *pa low′*, **Islands,** a group belonging to the Caroline Archipelago, in the North Pacific Ocean. They are 26 in number and extend nearly north-northeast and south-southwest. Their total area is about 180 square miles. They are fertile and have a good climate. The inhabitants are Polynesians. Since 1899 the islands have belonged to Germany. Population in 1904, 3101.

Pel′ican, the name of several different species of web-footed birds, whose striking peculiarity is the great pouch that lies under their lower mandibles. They are larger than swans, have great expanse of wings and are excellent swimmers. They live in flocks on the sea coast, lake shores and along rivers, feeding chiefly on fish, which they capture with great skill. The pouch of naked skin is capable of holding several fish, which the bird may preserve for its own consumption or may carry to its nest for its young. It is said that gulls sometimes, without apparent offense, perch upon the heads of the pelicans and take away such fish as protrude from the big bills. Although pelicans swim well and fly well, they are very clumsy on land and have difficulty in rising therefrom in flight; but many species perch habitually on trees and dash into the water after their prey, sometimes disappearing wholly from sight with a somersault. Their nests are rough, clumsy affairs, usually built in villages, several pairs of birds occupying the same trees, in company, also, with egrets and herons. If undisturbed, they will come from year to year to the same nests. The young are fed with partially digested food, which is prepared for their benefit by the parents. The *common,* or *white, pelican* has a delicate white plumage, tinged with rose or pink. One species, found in temperate North America, lacks the rosy tint and has a pendent crest. In general, the pelicans prefer a warm or tropical country.

Pelican Fish, a remarkable deep-sea fish. The body is somewhat eel-like and is fringed on the back and lower middle line with spines. It is remarkable for its enormous jaws, which support a pouch, resembling that of a pelican. In this pouch the pelican fish is able to hold fishes larger than itself.

Pel′la, the ancient capital of Macedonia, the birthplace of Alexander the Great. It surrendered in 168 B. C. to the Romans, and under their rule it sank from a large and magnificent city to a mere station.

Pellagra, *pee la'grah,* a disease caused by eating corn which has been harvested before it was ripe and allowed to ferment. It is believed that the disease is caused by the growth of fungi which constitute the smut (See SMUTS). Pellagra has long been prevalent in Egypt and European countries, but it usually appears in a mild form. In 1908 pellagra appeared in an acute form in several of the Southern States, and with scarcely an exception proved fatal, notwithstanding the efforts of the best physicians. Pellagra begins with disturbances in the digestive organs, which are followed by sleeplessness and often an eruption on the skin. In many cases headache and backache and spasms occur.

Pelop'idas (?–364), a Theban general and statesman. The supremacy of the Spartan faction in Thebes forced Pelopidas, with other exiles, to take refuge in Athens, but he returned in 379 B. C. and succeeded in overthrowing the Spartan party and recovering the citadel of Thebes. In the war which followed with Sparta, Pelopidas distinguished himself in the battles of Tegyra and of Leuctra, by which Thebes became for a time the leading power of Greece. In 364 he was sent against Alexander of Pherae, tyrant of Thessaly, whom he defeated, though he himself was slain.

Peloponnesian, *pel'o pon ne'shan,* **War.** See GREECE, subhead *History.*

Pel'oponne'sus, the peninsula which forms the most southern part of Greece, now called the Morea. It is joined to the remainder of the country only by the narrow isthmus of Corinth. The ancient Peloponnesus was divided into six states, Messinia, Argolis, Laconia (Sparta), Elis, Arcadia and Achaea. See GREECE, subhead *History.*

Pe'lops, in Greek mythology, son of Tantalus, king of Phrygia. Tantalus, who was a favorite with the gods, one day served to some of them a feast, the chief dish of which consisted of his son, Pelops. All of the gods recognized the dish that was set before them and refused to eat, except Ceres, who, deep in mourning for her daughter, noticed nothing and ate a part of the shoulder of the boy. Pelops was afterward restored to life by the gods, and Ceres furnished for the lost shoulder one of ivory. With the aid of Neptune, Pelops married Hippodamia and succeeded his father-in-law in the rule of the vast kingdom which, according to legend, was called after him Peloponnesus. Atreus and Thyestes were sons of Pelops.

Pel'vis, THE, a bony basin, formed by the two innominate bones and the sacrum. Into the sockets of the innominates are fitted the thigh bones. The lower part of the intestines is in the pelvic cavity. See SKELETON.

Pem'berton, JOHN CLIFFORD (1814–1881), an American soldier, born at Philadelphia. He graduated at West Point in 1837 and entered the artillery service. He served in the Mexican War and became major after the Battle of Molino del Rey. He resigned from the service at the outbreak of the Civil War, entered the Confederate army and soon was made major general. Pemberton conducted a skilful defense of Vicksburg before a continuous bombardment, from the middle of May until July 4, when he surrendered. After the war he became a planter in Virginia, but moved to Pennsylvania in 1876.

Pem'mican, the name of a food formerly prepared and extensively used by the indians living in the northern part of North America. Originally it consisted of dried lean meat, of the buffalo or deer, pounded to a powder and mixed with boiling fat, then pressed into cakes and packed in cases until needed. Beef is now used in the place of buffalo or deer meat. When properly prepared, pemmican contains a large amount of nourishment in a small space. For this reason it is still used by hunters and traders who travel long distances through the sparsely settled regions of Canada.

Pen, an instrument for writing with a fluid. Pens have been in use from very early times, and in each age they were adapted to the material on which the characters were to be made. The Roman's pen consisted of a metal stylus with a stiff point and was used for writing on tablets coated with wax. In Greece and in Eastern countries a hollow reed was used, and this undoubtedly led to the quill pen. Quill pens were made of the quills of the goose and crow and were used for several centuries before they were replaced by metal pens. The quills were taken from the wings of the bird and placed in hot sand until dry, when the pen was made by whittling the quill into shape with a small knife.

The manufacture of steel pens as a business was commenced by Joseph Gillott in 1820. Mr. Gillott succeeded in making a pen of thinner and more elastic steel and in giving it a better temper and finish than had been previously done. The method which he established has, with some improvements, been followed until the present time. Pens are now manufactured by machinery. Steel of the best quality is used. This is rolled into thin sheets six feet long and about one and one-half feet wide. These sheets are cut into strips, equal in width to the length of two pens. The strips are then heated to a dull red, in tight iron boxes, and allowed to cool slowly. When cooled they are cleaned and rolled with great care to the necessary thickness. Blanks, of the shape and size of the pen, are then punched from the plates. The blanks are then stamped and slit on each side of the point, so as to make the pen more flexible. They are then heated and rounded by being stamped with a die, which fits into a mold. The pens are then tempered, and the points are ground and split. The pens are then sorted, the imperfect ones being thrown out, and the others packed in boxes of one gross each. Birmingham, England, leads in the manufacture of steel pens and turns out over 30,000,000 a week. In the United States there are large manufactories in New York. The entire quantity of steel used for making pens each year is more than that used in the manufacture of all the guns, swords and needles in the world for the same length of time. Gold pens have their point tipped with iridium, to prevent wearing. Fountain pens contain a hollow penholder, which can be filled with ink, which flows as needed for use.

Penance, *pen'ans,* the punishment by which repentant sinners seek to atone for their offenses. By the Roman Catholic Church it is believed to be of divine origin (*Matt.* XVIII, 18; *John* XX, 23) and is reckoned as one of the seven sacraments. It includes contrition, confession and satisfaction, followed by absolution pronounced by the priest. The early Christians showed their belief in penance by their sorrow for sin, their self-inflicted pain, their fasts and the strewing of ashes on the head. Penance is not recognized by Protestant churches.

Penang', an island belonging to Great Britain, lying at the north entrance of the Malacca Strait, off the western coast of the Malay Peninsula. Its area is 107,000 square miles. The greater part of the surface is level, although there is a mountainous tract in the north. The island produces cocoanuts, areca, pepper, nutmegs, cloves, rice, sugar, coffee and indigo. There are large supplies of tin in the mountainous region. Georgetown, the capital and port of the settlement, is a growing town with a large commerce. Population of the island in 1901, 128,830.

Penates, *pe na'teez.* See LARES AND PENATES.

Pencil, *pen'sil,* an instrument used for writing or drawing. The earliest artists no doubt used pieces of colored earth or chalk, cut into forms convenient for holding in the hand. Such pencils were used in the monochromes, or one-color pictures, of the Egyptians and Greeks, but in the fourth century the Greek artists, on the introduction of wet colors, used fine hair brushes, made of hairs of the camel, badger, squirrel and goat. The use of lead for marking on papyrus was of very ancient origin, and because of this fact lead pencils are probably so called, though they are made not of lead, but of graphite, sometimes called plumbago, or black lead.

The manufacture of graphite pencils began in England in the sixteenth century, when a valuable mine of pure graphite was found at Barrowdale, Cumberland. This mine became exhausted in 1850, and afterwards powdered graphite, mixed with clay, was used. Graphite is now mined at Schwartzbach, Bohemia; at Passau, Bavaria, at Ticonderoga, N. Y., and in other parts of the United States. In the manufacture of pencils powdered graphite, free from all impurities, is mixed with pipe clay, the quantity depending on the degree of hardness required. For hard pencils they are mixed in equal parts, and for ordinary writing pencils the proportions are seven parts of clay to ten parts of graphite. After being ground together with water for several hours, the doughy mixture is shaped into leads, by being placed in an iron cylinder, with a plate in the bottom, which has holes of the same size as the leads to be made. By the use of a piston, worked by a screw, the mixture is squeezed out in coils through the holes. While wet, the coils are straightened, cut into pieces and allowed to dry. Pine and red cedar are generally used for casing. The wood, cut into little slabs the width of six pencils, is passed through a machine which makes the grooves. The graphite sticks are placed in these grooves, and another grooved slab is glued to it. The blocks are then cut into pencils, by being run through a machine with revolving knives, and are finished into various styles. Colored pencils are made by mixing colored clay or chalk with wax, and slate pencils are made from a soft variety of slate. The manufacture of lead pencils is extensive in England, France, Bavaria, Austria and the United States. The largest pencil manufactory in the world is that of the Joseph Dixon Crucible Company, at Camden, N. J.

Pen'dant, in architecture, a hanging ornament, used in the vaults and timber roofs of

Gothic buildings, more particularly in late Gothic work. In vaulted roofs, pendants are of stone and generally are richly carved; in timber roofs, they are of wood, variously decorated. Fine examples of stone pendants are to be seen in the chapel of Henry VII, at Westminster Abbey.

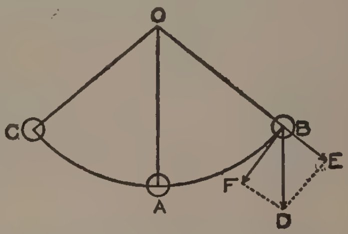
Pend d'Oreille, *pahN do ra'y'*. See Kalispel.

Penden'tive, a triangular section of masonry, which supports a cupola or dome. The Byzantine architecture of the sixth century introduced the use of pendentives, making it possible to erect domes on rectangular or polygonal walls. The power of pendentives is shown in the Church of Saint Sophia at Constantinople. See Dome.

Pen'dleton, Ore., the county-seat of Umatilla co., about 45 mi. s. w. of Walla Walla, Wash., on the Umatilla River, and on the Washington & Columbia River railroad and the line of the Oregon Railroad & Navigation Company. The town is in a great wheat-growing region, where the raising of cattle, sheep and horses is also extensively carried on. The river furnishes good water power, and there are flour and woolen mills, wool-scouring plants, machine shops, ice works and other factories. The municipality has electric lights and owns good water works and sewage systems. There are two academies, three banks, two daily and two weekly newspapers, four hotels, a hospital and a number of churches. Population in 1900, 4406.

Pendleton, George Hunt (1825–1889), an American lawyer and statesman, born at Cincinnati, Ohio. He studied law, was admitted to the bar and achieved distinction in his profession. He was elected to the state legislature and then to Congress in 1856, where he served four successive terms. During the Civil War he was a constant opponent of the administration, and for his severe criticisms he incurred public censure. He was nominated by the Democrats for vice-president of the United States in 1864, became a conspicuous figure in the Greenback party and in 1879 was elected to the United States Senate. There, as chairman of the committee on civil service reform, he fought valiantly for the improvement of the public service, being the author of the Pendleton Bill, which became a law January 16, 1883, and firmly established the merit system of public appointment (See Civil Service and Civil Service Reform). In 1885 he was appointed minister to Germany and held the position until his death at Brussels.

Pen'dulum, a weight suspended from a fixed point, so that it will swing freely to and fro by the force of gravity and the impulse which it receives from its own motion. A small, heavy body, suspended from a fixed point by a string and caused to vibrate without much friction, is the simplest form of pendulum. In the figure, *A* is the weight, *O* the point of suspension, and *B* and *C* the ends of the path over which the pendulum swings. The path *CAB* is called the *arc*, and the movement of the pendulum from *B* to *C* constitutes a *vibration*. The force of gravity tends to draw the ball at *B* in the direction of *BD*, but the resistance of the string, *OB*, causes it to take the direction of the resultant, *BF*, which is at right angles with *BE*, and thus to swing in the arc *CAB*. The distance from the lowest point in the arc to either end, as *AB* and *AC*, constitutes the *amplitude* of the vibration. Clock pendulums are usually made by the hanging of a circular piece of metal, called the *bob*, or *disk*, to a wire, which is attached by its upper end to the frame of the block.



The time of vibration of a pendulum depends upon its length. A pendulum which will vibrate seconds in the latitude of New York is about 39.1 inches or .993 meters long. The vibrations are governed by the following laws:

(1) In the same pendulum, all vibrations of small amplitude are made in the same time.

(2) The times of vibration of different pendulums are proportional to the square roots of their respective lengths. If a pendulum to vibrate seconds must be 39.1 inches long, one to vibrate three times as fast would have to be one-ninth as long.

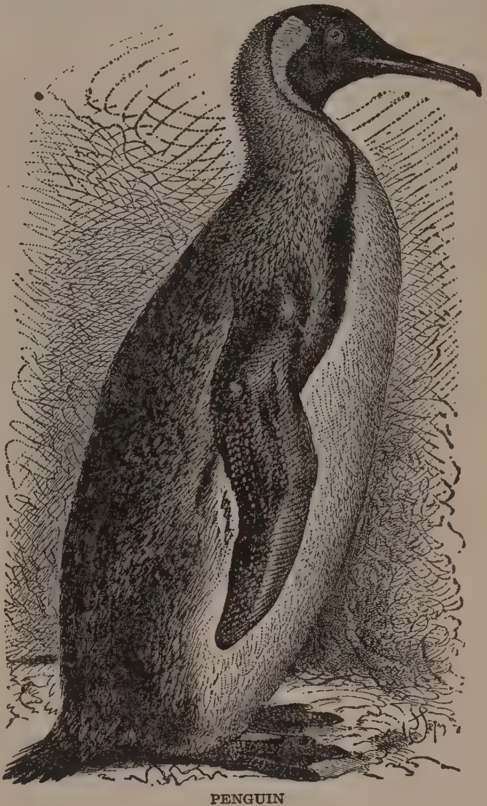
(3) The time of vibration for the same pendulum will vary in different places, since it decreases as it is moved from the equator to the poles.

Since the rod in most clock pendulums lengthens in summer and shortens in winter, it is necessary that means for preserving the uniform length of a pendulum be provided. In clocks known as regulators, such as are used by watch makers, the pendulum rod consists of a frame of rods of different metals, so arranged that as some expand downward, others expand upward, thus keeping the mean length of the pendulum the same. Another style, known as the mercurial pendulum, has but one rod, but the weight consists of a cup containing mercury. As the rod lengthens, the mercury expands upward, and as the rod shortens, the mercury contracts downward, thus preserving the length of the pendulum. See CLOCK.

Penel′ope, in Greek mythology, the wife of Ulysses. Shortly after the birth of his son Telemachus, Ulysses set out on the expedition against Troy, and during his twenty years of absence Penelope was constantly besieged by a host of suitors. She tried to rid herself of them by promising them that she would make a decision as soon as she had finished a piece of tapestry which she was weaving. Each night, however, she raveled what she had done during the day. When her suitors became aware of this device, they grew more clamorous, and Penelope stated that she would marry any one of them who could bend the bow of Ulysses, knowing well that none of them was strong enough to do this. When the day of the trial came, an aged beggar who had made his way to the palace entered with the suitors and, after they had all tried, took the bow and bent it easily. He then threw off his disguise, showed himself as Ulysses and put to death his wife's persecutors.

Pen′guin, a web-footed bird of the Antarctic regions, which corresponds to the auk of the North Polar regions. On shore the penguins are awkward birds, crawling along with rapidity on their bellies by the aid of their short wings, which are entirely useless for flight. In the water, however, the birds swim with great rapidity, using their wings as paddles. They nest in colonies, and while the females are sitting on the eggs, they are fed by the males and become very fat. Penguins are often seen during this season sitting erect in long straight lines, like soldiers, arranged in divisions, according to age. Their breasts are covered by a silvery plumage that is so soft, close and velvety that fur dealers use it extensively in making muffs and similar articles. There are several varieties, of which the common penguin, found in immense numbers about the Straits of Magellan and in the Falkland Islands, is the leading type.

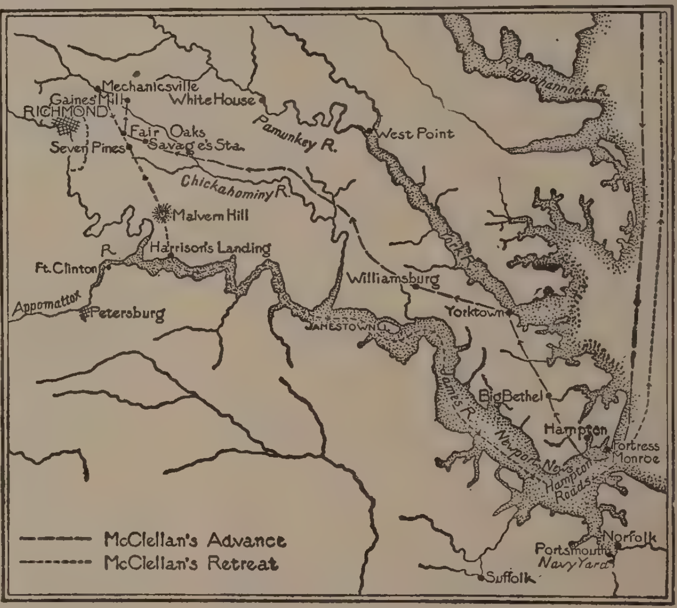
Penin′sula Campaign, the name given to the campaign of the Federal Army of the Potomac under General McClellan against Richmond, Va., between April and July, 1862. It was so called because of the attempt to reach Richmond by a march along the peninsula between the York and James rivers (See MCCLELLAN, GEORGE BRENTON; CIVIL WAR IN AMERICA). McClellan's army of 120,000 men arrived at Fortress Monroe in April. Advancing a short distance, McClellan took up a position before Yorktown, where he maintained a month's siege, but before he was ready to make a final assault the Confederates had escaped. They were pursued by Hooker, who suffered a reverse at Williamsburg. McClellan then continued his march up the peninsula. McDowell, who was at Fredericksburg, was ordered to reënforce McClellan, but 20,000 Confederates, under Stonewall Jackson, by rapid marches through the Shenandoah Valley, attacked the Federal force under Banks with such success at McDowell, Front Royal and Winchester, that McDowell was ordered to send 20,000 men into the Shenandoah to catch Jackson. The latter succeeded easily in making his escape.


PENGUIN

Meantime, on May 31, Johnston attacked the vanguard of McClellan's army at Fair Oaks, but was defeated. In this engagement, Johnston was wounded, and Lee became the commander of the Confederate force before Richmond, known as the Army of Northern Virginia. After fortifying his position, Lee dispatched reënforcements to Jackson in the Shenandoah Valley, with orders to attack the right wing of the Federal lines under Porter. In pursuance of this plan, A. P. Hill opened a battle at Mechanicsville on June 26, but was repulsed with great loss. This battle opened what is known as the Seven Days' Battles. Porter then withdrew to Gaines's Mill, where he was attacked on the following day. He sustained the attack until the middle of the afternoon, against a force outnumbering his more than two to one, but was finally compelled to retreat, leaving several guns in the hands of the enemy. This gave the Confederates opportunity to cut McClellan's communication with his base of supplies at White House, on the Pamunkey River. McClellan therefore decided to transfer his base to the James River. Destroying all stores and supplies that could not be moved, and abandoning 2500 sick and wounded to the enemy, he began a difficult march across White Oak Swamp and after a time was hotly pursued by the Confederates. They overtook the retreating Federals at Savages' Station, but were defeated after a severe engagement. Another severe battle was fought at Frazer's Farm, between Longstreet and Hill of the Confederates, and McCall, Heintzelman and Sumner of the Federals, resulting in a drawn contest.

The Federals reached Malvern Hill, near the James River, on July 1. There they were attacked by the main Confederate army, under Lee, who thought that the force which he was confronting was only a remnant of McClellan's army. The Confederates, naturally, were defeated at every point with fearful slaughter (See MALVERN HILL, BATTLE OF). Nevertheless, McClellan ordered a precipitate retreat, and after reorganizing his forces at Harrison's Landing, he embarked for Washington, thus ending the Peninsula Campaign. The total loss during the Seven Days' Battles to the Federal armies was about 15,000, while that of the Confederates was probably a little less. The campaign had accomplished nothing, except weakening the confidence of the Federal army, strengthening that of the Confederates and leaving in the hands of the Southern armies many prisoners, as well as a vast amount of artillery and ammunition.

Peninsular War, The, a struggle caused by the intrigues and ambition of Napoleon, who proposed the partition of Portugal and placed his brother Joseph upon the throne of Spain. For a time the whole peninsula was occupied by French troops, but the Spanish and Portuguese peoples rose in defense of their liberties and waged a fierce guerrilla warfare against the invaders. Of the memorable struggle which ensued, the main features were the retreat of Sir John Moore to Coruña, and his death there; the accession of Sir Arthur Wellesley to the supreme command; his formation of the celebrated lines of Torres Vedras, where he held the French armies in check until he had accomplished the complete liberation of Portugal, and his subsequent victorious march through Spain, marked by the great battles of Salamanca and Vitoria.



PENINSULA CAMPAIGN

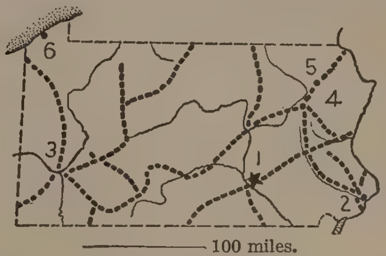
Penn, William (1644–1718), the founder of the State of Pennsylvania, born in London. While attending Christ Church, Oxford, he accepted Quaker views, which caused his expulsion from the university and led his father to adopt harsh measures against him. In 1668 Penn became a Quaker preacher, and on account of an essay, entitled *The Sandy Foundation Shaken*, was imprisoned in the Tower for seven months. During this time he wrote his most celebrated works, *No Cross, No Crown* and *Inno-*

cency with Her Open Face. The persecutions of Dissenters continuing to rage, Penn turned his thoughts toward the New World. From his father he had inherited a claim upon the government of $80,000, and in settlement of this claim the government in 1681 granted him large territories in North America, including the present State of Pennsylvania, with the right to found a colony or society with such laws and institutions as expressed his views and principles. A settlement was established in 1682, and a little later Penn came to America and laid the foundations of his colony on a more free and democratic basis than had at that time been allowed in the world. Members of all denominations and countries gathered there; the city of Philadelphia was laid out upon the banks of the Delaware, and the colony soon came into a most flourishing condition. Penn remained in the province about two years. At the Revolution of 1688 his intimacy with the abdicated monarch created suspicions, and he was accused of treason, but was several times acquitted. In 1699 he again sailed for Pennsylvania, intending to make it the place of his future residence; but he returned to England in 1701.

WILLIAM PENN

Penn′sylva′nia, the KEYSTONE STATE, one of the Middle Atlantic states, bounded on the n. by New York, on the e. by New York and New Jersey, on the s. by Delaware, Maryland and West Virginia and on the w. by West Virginia and Ohio. A small portion of the northeastern corner borders on Lake Erie. The length of the state from east to west is 302 mi., and from north to south, 157¾ mi. The area is 45,086 sq. mi. Population in 1900, 6,302,115, of which 160,451 were colored.

SURFACE AND DRAINAGE. The surface of Pennsylvania is divided into three distinct regions. The southeastern region occupies all of that portion of the state between the eastern and southern boundaries and the first range of mountains and is a part of the Piedmont plateau (See PIEDMONT REGION). The eastern portion of this region is at sea level, and the surface rises by gradual slopes from this low plain to an altitude of 500 feet at the foot of the mountains. The surface is somewhat rolling and is crossed in a number of places by chains of hills. The largest of these, known as South Mountain, extends entirely across the state, in a southwest and northeast direction. The second, or highland, region, comprises the mountainous section, which extends across the state from the northeastern corner in a southwesterly direction. Beginning with the low ridge known as South Mountain, this region comprises several parallel ranges of mountains separated by intervening valleys. The most important of these on the east is Blue Mountain, which in New Jersey is known as the Kittatinny range; through this the Delaware River cuts its way, forming the famous Delaware Water Gap. West of Blue Mountain are a number of ranges with different names, all of which belong to the Alleghany Mountains. All of these mountains have steep slopes on the eastern side and gradual slopes on the western. Nowhere do they reach an altitude of 3000 feet, and their average height is from 1000 to 2000 feet. Streams flow through the intervening valleys, and the Susquehanna cuts its way across the ranges. Much of this region is covered with forests. The third region, known as the Alleghany plateau, occupies fully one-half of the state and lies to the west of the mountain region. This is



PENNSYLVANIA

1, Harrisburg; 2, Philadelphia; 3, Pittsburg; 4, Wilkesbarre; 5, Scranton; 6, Erie.
Dotted lines indicate chief railroads.

a high plateau, varying in altitude from 1000 to 2500 feet and containing many deep valleys and steep slopes, these having been formed by streams which have worn their channels through the soft strata underlying the surface. The high plateau extends almost to the shore of Lake Erie.

The eastern part of the state is drained by the Delaware River, which receives a number of short tributaries. The most important of these are the Schuylkill and the Lehigh, the former entering the Delaware at Philadelphia and the latter at Easton. A few streams in the southeastern corner enter the Susquehanna. This river drains the northeastern and central parts of the state. It is formed by its North and West branches, which unite at Northumberland. It flows entirely across the state in an irregular course and receives numerous tributaries, most of them shallow, rapid mountain streams, the largest being the Juniata. The Alleghany plateau is drained principally by the Ohio and the two great streams from which it is formed, the Allegheny and the Monongahela. The region bordering on Lake Erie is drained into the lake by a few short streams. A small area in the south is drained into the Potomac River. There are in the mountains occasional tarns, or mountain lakes, but Pennsylvania has no lakes of any importance.

Climate. The climate of the state is different in the three natural divisions. In the northwest and west, heat and cold are excessive and changes are abrupt. In the north and mountain regions, the winters are severe and the summers delightfully cool. The climate of the eastern section is marked by irregular alternations of the seasons. But the climate is, in general, healthful. The mean temperature at Philadelphia is 54°. The average annual rainfall ranges from 36 inches, in the western counties, to 42 inches, at Philadelphia. Heavy snows fall on the mountains in winter, and the rivers of the western half of the state are often flooded in the spring.

Mineral Resources. Pennsylvania contains the largest deposits of anthracite coal known. The anthracite mines are found in seven districts, at Pittsburg, Wilkesbarre, Hazelton, Shenandoah, Ashland, Pottsville and Scranton, and the output of anthracite exceeds that of any other state or any country. In the western part of the state are extensive measures of bituminous coal. These are located in the Monongahela City, Irwin, Mercer, Towanda, Connellsville, Johnstown, Idlewood and Philipsburg districts. Many of the coal measures contain layers of sandstone, iron ore, limestone and fire clay between the seams of coal, and much of this material is mined with profit in connection with the fuel. There are marble quarries near Philadelphia, lead and copper mines at Phoenixville and nickel deposits in Lancaster County. Slate is also found in large quantities in the state, and a number of counties contain extensive beds of iron ore, which have been worked with profit for many years. In the western part of the state is the oil field, in which petroleum was first discovered in the United States; for a long time Pennsylvania was the leading state in the production of petroleum, but it is now exceeded by Ohio. Natural gas is also found in large quantities in and about Pittsburg and neighboring localities. The state also contains many salt springs, but they have not yet been developed. Feldspar, flint, glass sand, graphite and talc are also found in considerable quantities.

Agriculture. The valleys between the mountains and the lower slopes of the hills and plateaus contain a fertile soil. This, with an abundant rainfall and a genial climate, well adapts the state to various lines of agriculture. In general, farming is widely diversified, and no one industry leads. The chief crops are rye, in which the state takes first rank in the Union, corn, oats, wheat, buckwheat, potatoes and hay. Large quantities of tobacco are raised, and in some regions the maintenance of nurseries is an important industry. The hillsides and mountainous regions are well adapted to grazing, and dairying is one of the most valuable branches of agriculture within the state. Large numbers of cattle, horses, sheep and swine are also raised for market. Dairy and poultry products are of considerable importance.

Manufactures. Next to mining, manufacturing is the chief industry of Pennsylvania. The state ranks second in the Union in the value of its manufactures, which are chiefly of iron and steel. In iron products, Pennsylvania yields as much as all the other states combined. The first blast furnace was opened by William Penn in 1688. The manufacture of Bessemer steel was begun in 1867. The state now ranks first in the production of pig iron and of Bessemer steel. The manufactures of textiles rank second among the industries of the state. Philadelphia is the greatest textile center in the country and makes more ingrain carpets than any other city. The industry third in rank is the manufacture of foundry and machine shop products. The state ranks first in the Union in the refining of petroleum and in the manufacture of steam locomotives, of coke and of glass products. For more than a hundred years Pennsylvania has stood at the head of glass-making states. Other important industries are leather tanning, car building, printing and publishing, the making of tobacco products, malt liquors, men's and women's clothing, flour and grist mill products, lumber and planing mill products. An industry of growing importance, and one in which the state takes foremost rank, is the building of iron and steel ships.

TRANSPORTATION AND COMMERCE. In the early history of the state a number of canals were constructed, leading from the interior to the Delaware and Potomac rivers, but since the building of railways most of these have been abandoned, though a few are still in use for the transportation of coal. The state is threaded by railway lines extending in all directions, and it is exceeded in mileage only by Illinois and Texas, now having about 11,140 miles of road. Some of the principal lines are the Pennsylvania, the Baltimore & Ohio, the Philadelphia & Reading, the New York Central & Hudson River, the Erie, the Lake Shore & Michigan Southern and the Lehigh Valley. Philadelphia and Pittsburg are the chief railway centers. Many lines are projected into the mining regions and serve chiefly for the transportation of coal and ore, but all parts of the state are well provided with railway communication.

The commerce of the state is extensive. The exports consist chiefly of coal, iron and steel, manufactured products and building stone of various kinds, while the imports consist of manufactured goods and raw material, especially iron ore, which is smelted at Pittsburg and other important iron manufacturing centers. A great deal of the commerce between the seaboard and the western and central states passes through Pennsylvania.

GOVERNMENT. The legislature consists of a senate of 50 members and a house of representatives whose number of members depends upon the population, apportionment being made after each Federal census. The senators are elected for four years, and the representatives for two. The legislature meets biennially, and the sessions are not limited as to time. The executive department consists of a governor, a lieutenant governor, a secretary of internal affairs, an auditor-general and a treasurer. The governor and lieutenant governor are elected for four years, the secretary of internal affairs and auditor-general, for three years, and the treasurer, for two years. Other executive officers, appointed by the governor and confirmed by the senate, are the attorney-general, the superintendent of public instruction and the secretary of the commonwealth, their terms being four years. The courts consist of a supreme court of seven judges, elected by the people for twenty-one years and not eligible for reëlection; superior courts, which are held in the various judicial districts into which the state is divided; courts of common pleas and quarter sessions, besides local courts, established in towns and cities.

EDUCATION. The present system of education dates from 1834, when Pennsylvania established a system of free public schools. The schools are under the direct supervision of the superintendent of public instruction. Counties are divided into districts, each of which usually includes a township. The schools of the district are managed by boards of directors elected by the people, and these boards within the county elect a county superintendent. All cities have excellent systems of graded schools, but in some of the rural sections the schools are small and the minimum term is seven months. The state maintains thirteen normal schools, distributed among as many normal districts. The annual expenditure for public schools is over $28,000,000, of which more than $5,500,000 are appropriated out of the annual revenue of the state. The chief higher institutions of learning are the University of Pennsylvania at Philadelphia, Western University of Pennsylvania at Allegheny, Dickinson College at Carlisle, Lafayette College at Easton, Lehigh University at South Bethlehem, Haverford College at Haverford and Pennsylvania State College at State College, with which is affiliated the agricultural experiment station. The United States government maintains at Carlisle one of the leading schools for the instruction of indians.

INSTITUTIONS. The state maintains two schools for the education of the deaf, two asylums for the blind and two for the feeble-minded. In addition to these a number of deaf and blind children are educated in private institutions which receive state aid. There is a soldiers' and sailors' home at Erie, and the hospitals for the insane are at Harrisburg, Danville, Norristown, Warren, Dixmont and Wernersville. The penal institutions comprise penitentiaries at Philadelphia and Pittsburg (Allegheny), a workhouse in Allegheny County, a house of correction and a house of refuge at Philadelphia, a reform school at Morganza and an industrial reformatory at Huntington.

Cities. The chief cities are Harrisburg, the capital; Philadelphia, Pittsburg (now including Allegheny), Scranton, Reading, Erie, Wilkesbarre, Lancaster, Altoona, Johnstown, Allentown, McKeesport, Chester, York and Williamsport, each of which is described under its title.

History. The first permanent settlement in the State of Pennsylvania was made by the Swedes in 1643, near the present site of Chester. It was taken by the Dutch in 1655 and by the English in 1664. The whole territory was granted by Charles II to William Penn in 1681, and the following year the capital of his province, Philadelphia, was built. Penn organized an extremely liberal government and attracted to his colony many persons who had suffered persecution in the Old World. However, Pennsylvania became extremely disorderly and at several different times the colony was taken from Penn, but was each time restored. During the French and Indian Wars, Pennsylvania refused to coöperate with the other colonies, but it suffered much through the raids of the indians and French, and at the close of the wars it erected a costly chain of forts on its frontier. The state was engaged in a long dispute with Connecticut over the Wyoming Valley, and in 1778 it witnessed the awful massacre at that place. Pennsylvania took an active part in the Revolution and organized a separate state government in 1776. Philadelphia was the seat of the Congress during the war, and important military events also took place within the borders of the state. The Federal Constitution was adopted at Philadelphia in December, 1787. During the slavery controversy, Pennsylvania was a loyal Union state and furnished many troops for the Federal armies. The state was three times invaded, the last time by Lee's army, which was defeated at Gettysburg. The recent events of interest were the Centennial Exposition (1876), the Johnstown flood (1889), the Homestead strike (1892) and the anthracite coal strike (1902). Since the war the state has been almost invariably a Republican stronghold, but has twice elected a Democratic governor. Consult Fisher's *Making of Pennsylvania.*

Pennsylvania, University of, an institution of higher learning, located in Philadelphia and established in 1740 as a charitable school. In 1755 it was raised to the rank of a college, and in 1791, by act of the legislature, it was made the University of Pennsylvania. It maintains he following departments: the college, which includes the art school, courses for teachers and the Towne Scientific School; the department of philosophy, which includes the graduate school; the departments of law, medicine, dentistry, veterinary medicine and archaeology; the Wistar Institute of Anatomy and Physiology; the department of physical education, and the Flower Astronomical Observatory. The university has provision for a large number of scholarships and fellowships, whose incomes range from $200 to $800. The medical school has achieved an international reputation. The faculty numbers about 345 and the enrollment is over 3350. The library contains 226,000 volumes.

Penny, a small English coin and money of account. The coin is of bronze, weighs 145.833 troy grains and is worth, intrinsically, about one-fourth of its face value. It is equivalent to 4 farthings, one-twelfth of one shilling and one two-hundred-fortieth of a pound sterling. It is equal to 2 cents in United States money. Its abbreviation is *d.*, having been derived from its similarity to the Roman coin *denarius.* A similar name, the *pfennig*, is given to the German coin, originally of silver, worth one two-hundred-fortieth of a German pound of silver. It is now made of nickel and is equivalent to one one-hundredth of a *mark*, or about one quarter of a cent.

Penob'scot, a river of the United States, the largest in the State of Maine. It rises in Somerset County, near the Canadian boundary, runs southeastward, then south and finally flows into Penobscot Bay. Its total course is about 350 miles, and it is navigable for large ships to Bangor, 60 miles from its mouth. The river is of great use in transporting the supplies of timber which are cut on its banks.

Pen'saco'la, Fla., the county-seat of Escambia co., 48 mi. e. of Mobile, Ala., on the Pensacola Bay, 6 mi. from the Gulf of Mexico, and on the Louisville & Nashville and the Pensacola, Alabama & Tennessee railroads. It has an excellent harbor, with forts Pickens, Barrancas and McRee at the entrance, and is the most important city of western Florida. There is a large trade in lumber, fish, naval stores, cotton and coal. A United States navy yard is located here. The city has public parks of considerable beauty, and the remains of the old Spanish forts, San Bernardo and San

Miguel, are also of interest. The important buildings are the state armory, the Federal building, the courthouse, an opera house and public school buildings. Pensacola was first permanently settled by the Spaniards in 1696. It was captured by the French in 1719, but was restored to the Spaniards four years later. The British took possession in 1763, but the place was captured by the Spaniards in 1781. General Jackson occupied the city during the War of 1812. The United States secured permanent possession in 1821, in accordance with the treaty of 1819, and the navy yard was soon after established. The city suffered considerably from a fire in 1864. Population in 1900, 17,750; estimated in 1904 at 22,000.

Pension, *pen'shun,* an annual allowance of money settled upon a person, usually for services previously rendered. The pension system of the United States presents two peculiar features, namely, the almost entire absence of a civil list and the non-recognition of long service as a ground for pension. Generally speaking, pensions are granted only for active service in time of war, and, therefore, the beneficiaries are the survivors (or their widows and children) of the armies of volunteers and conscripts who took part in the country's several wars. On June 30, 1905, the list of pensioners, besides those arising out of the Civil War, was as follows: Revolution, widow, 1, daughters, 4; War of 1812, widows, 776; Indian wars, survivors, 2269, widows, 3461; Mexican War, survivors, 4540, widows, 7653; Spanish-American War, survivors, 15,711, widows, 4780.

But the great part of the United States pensions are "invalid pensions," for those totally or partially disabled from wounds or disease contracted during the Civil War; the widows and children under sixteen years of age of those who have died from wounds or disease; or, in the event of no widows or minor children surviving, then the dependent parents, or minor brothers and sisters, of officers or men who have so died. The pensions, which range from $24 to $2000 per annum, are graded according to the degree of disability or dependence. Thus, where the aid and attendance of others is required, from $50 to $72 a month is paid; where the beneficiary is incapacitated for manual labor, $30 a month; for the loss of a hand or foot, or total deafness, $30; of both feet or hands, or both eyes, $72 a month, and for amputation at the shoulder or hip joint, $45. Widows or dependent relatives of privates receive $12 a month; children, $2 each, but if the widow does not survive, they receive their pensions jointly. Widows or dependent relatives of officers receive from $15 to $30 a month. The pensions of widows cease when they marry.

For the administration of the pension system, an independent bureau was created in 1833; since 1849 it has been a bureau of the department of the interior. The following figures show the enormous growth of the American pension system: In 1862 the disbursements slightly exceeded $790,000; in 1872 they exceeded $30,000,000; in 1882, $54,000,000; in the year ending June 30, 1890, $109,357,534, or nearly one-fourth the entire revenue of the nation. In June, 1890, a dependent pension law was passed which vastly increased the rolls. There were 998,441 pensioners on the rolls in June, 1905, and the total disbursements in that year were $142,099,286. The total number of applications filed since 1861 is 3,033,336, of which 1,876,096 have been granted. The total cost of the pension bureau since its organization has been $3,037,826,081. The cost per capita of the population in 1905 was about $1.77. By an executive order, issued April 13, 1904, later enacted into law, all veterans 62 years old are to receive $6 per month; at 65, this is to be increased to $8 per month; at 68, to $10; at 70, to $12 per month. This adds an annual expenditure of about $60,000,000.

It may be added that by an act of 1882, children of keepers or crew of a life-saving or lifeboat station who perish in, or from injuries received through, the life-saving service, are given the full pay of the deceased for two years. Federal judges and some other civil officers may be retired at a certain age, some of them on full pay. Army and naval officers are retired at a specified age on half pay.

Pentateuch, *pen'ta tuke,* the name given to the first five books of the Old Testament, *Genesis, Exodus, Leviticus, Numbers* and *Deuteronomy,* when regarded as a whole. By the Jews these were known as the Books of the Law. Some modern authorities consider that the book of *Joshua* should be added. Most biblical scholars believe the books of the Pentateuch to have been written by Moses, but some dissent from this opinion and consider portions of them to have been written after Moses died.

Pen'tecost, a Jewish festival, held on the fiftieth day after the Passover, in celebration of the ingathering of, and in thanksgiving for, the harvest. It was also called the *Feast of Weeks,* because it was celebrated seven weeks after the Passover. In the Christian Church it occurs fifty days after Easter, and commemorates the descent of the Holy Ghost on the disciples. In England it is called Whitsuntide, or Whit-Sunday, because of the white robes worn by the newly baptized.

Penum'bra, the partial shadow between the full light and the total shadow. The light shading in Fig. 2 in the article ECLIPSE shows the penumbra. An eye placed in the penumbra would see part of the luminous body; an eye placed in the *umbra,* or total shadow, would receive no rays from the luminous body; an eye placed anywhere else than in the penumbra and umbra sees the luminous body without eclipse. In a partial eclipse of the sun, as long as any part of the same is visible, the persons observing are in the penumbra; when the eclipse is total, in the umbra.

Pe'ony, a plant belonging to the crowfoot family. It is a native of Europe and Asia and is very generally cultivated in gardens, for the sake of the large, showy flowers, which are solitary and of a variety of colors, crimson, purplish, pink, yellow and white. Excepting one shrubby species, a native of China, of which several varieties, with beautiful whitish flowers, stained with pink, are cultivated in gardens, the peonies are odorless or have a disagreeable odor. The common peony was once in great repute as a medicine.

People's Party. See POPULIST PARTY.

Peo'ria, ILL., the county-seat of Peoria co., 160 mi. s. w. of Chicago, on the Illinois River and on the Chicago, Burlington & Quincy, the Illinois Central, the Chicago & Northwestern, the Chicago, Rock Island & Pacific, the Lake Erie & Western and several other railroads. The city is built along the river at the outlet of the expanse known as Peoria Lake. The business section lies near the water, while the residences are chiefly on the bluff. The educational institutions include the Bradley Polytechnic Institute, Spalding Institute, Sacred Heart Academy and a good high school, connected with the public school system. The city has a large public library, and law and high school libraries. Some of the charitable institutions are the Saint Francis Hospital, the Saint Joseph Home for the Aged, the House of the Good Shepherd and an orphanage. Other important buildings are the courthouse, the city hall, the Federal building, a cathedral, the Y. M. C. A. and the Coliseum, which seats about 6000 people.

As an industrial center, the place is very important. It contains large agricultural implement works, extensive distilleries, glucose works and a large variety of other establishments, including foundries, machine shops, printing houses, strawboard works, packing houses, cooper shops, flour and lumber mills, wagon works and other factories. There is also a large trade in grain and live stock.

The place where Peoria now stands was visited by La Salle about 1680, and Fort Crevecoeur was then erected. The French settled here about 1778, but they were suspected of inciting the indians against the Americans and were driven away by the United States soldiers about 1812. Seven years later the first permanent settlement was made, and this was incorporated as a town in 1835 and was chartered as a city ten years later. Population in 1900, 56,100; since 1900 North Peoria has been annexed, thus increasing the population by about 3000.

Pep'in or **Pip'pin,** the name of two distinguished Frankish rulers of the eighth century, under the last kings of the Merovingian dynasty. 1. PIPPIN OF HERISTAL (?–714), major-domo at the court of Dagobert II, was, after the death of the king, appointed duke of the Franks, and under a feeble regency he ruled the kingdom with almost despotic sway. Charles Martel was his natural son. 2. PIPPIN THE SHORT (714–768), son of Charles Martel, was, by agreement with the pope, proclaimed king of the Franks in 752, after the deposition of Childerich. He was induced by the pope to undertake several campaigns against the Lombards, and the land which he took from that people he gave to the pope. Charles the Great was his son.

Pep'per, a genus of plants which furnishes the black pepper of commerce, a native of the East Indies, where it is cultivated on an extensive scale. It is a climbing plant, with large, broad leaves, very small flowers and little globular berries, which, when ripe, are of a bright red color. The pepper of Malacca, Java and, especially, Sumatra, is best. White pepper is the best of the berries, gathered when fully ripe and deprived of their external skin. It is an interesting fact that pepper was the most important article of trade with the East until cotton, sugar and coffee became known, and was one of the costliest spices until the fourteenth century. Red pepper is obtained from the pods of the capsicum (See CAPSICUM). (See illustration on next page.)

Pepper, WILLIAM (1843–1898), a celebrated physician, professor and leader in the University of Pennsylvania, at Philadelphia. Doctor Pepper was one of the prominent men of the city and a remarkably successful teacher, whose advice was sought freely by other physicians. He published *Diseases of Children* and edited the *System of Medicine by American Authors,* besides contributing widely to the periodicals of his profession.

PEPPER

Pep'sin, a substance found in the gastric juice. Its nature is little known, but it has the power to digest proteids, changing them into peptones, resembling in this the trypsin of the pancreas, which, however, acts in an alkaline medium. Pepsin differs from ptyalin, the ferment of saliva, by its being active in a definitely acid medium, while ptyalin acts more freely in one slightly alkaline.

As employed in medicine for digestive purposes, pepsin is usually obtained from the stomach of the pig or calf, by the drying of the fresh mucous lining of the stomach at a temperature below 100° F. That prepared from the stomach of the pig, and known in medicine as *pepsina porci,* is preferred. See PEPTONES; PROTEIDS.

Pep'tones, a class of proteid substances, produced during digestion by the action of the pepsin of the gastric juice upon the nitrogenous elements of the masticated food in the stomach. The production of peptones is the main function of the digestion of the stomach.

The main features of peptones, distinct from other proteids, are their ready diffusibility and their solubility in water and in neutral saline solutions. The white of egg, for instance, as soon as it is acted on by the gastric juice, is easily soluble, and passes in solution through the membranous lining of the stomach into the system of surrounding blood vessels.

Pepys, *peps, peeps* or *pep'is,* SAMUEL (1633–1703), a famous English diarist, whose *Diary* gives a detailed and invaluable account of court life in England during the years from 1660 to 1668. This was deciphered from the shorthand notes in which it was written and was first published in 1825. It has gone through numerous editions and remains very popular, being written in a fresh, breezy style and containing a great store of interesting and amusing anecdote.

Pe'quot, a warlike tribe of New England indians, which was practically exterminated in a bloody war with the white settlers in 1637

Perception, *per sep'shun,* the mental power by which we interpret impressions received through the senses. Sensations grow into perceptions, and the relation between sensation and perception is so close that we cannot find a clear line of separation between them. Perception is a complex act, including sensation and all the other mental powers. When one becomes conscious of a sensation, he immediately gives his attention to it. This involves an act of will. The idea received is then compared with other ideas in the mind, calling into play memory, which brings these ideas into consciousness, the thought power, used in the process of comparison, and the judgment, used in deciding whether the new idea agrees or disagrees with the old.

The ideas obtained by perception form the earliest content of the child's mind. These ideas become more complex and elaborate as the powers of observation develop, and before a complete idea of any object is obtained, a number of observations are necessary. Since each sense gives knowledge of qualities that cannot be obtained through any other, it is also necessary that all the senses possible be brought to bear upon an object in order that a complete idea of it may be obtained. Ideas obtained through the senses of sight and touch alone are incomplete and often misleading. As ideas are apprehended, they are compared with the ideas in the mind and classified. See APPERCEPTION; CONCEPT.

REALIZATION OF SELF. Perception is not only an isolating process, singling out the idea to which attention is given from numerous sensations clamoring for recognition, but it is also one in which the child identifies himself as something distinct from the object perceived. He does not recognize the image of the apple formed upon the retina, but the apple itself; neither does he recognize the vibrations of his mother's voice while singing a lullaby, but the tones which he locates at their source. This realization of the self is slow and difficult, and is only fully developed with the perfection of the organs of sense.

Transferred Perceptions. We soon learn to use perceptions acquired through one sense in interpreting those received through another, as the recognition of a friend by his voice or his step. Ability to do this saves much in the way of time and energy. Were it not for the power to transfer perceptions, we should not know by looking at a glowing iron that it is hot, or at ice, that it is cold. This is no more nor less than saying that we use our experience in furthering our acquisition of knowledge.

Cultivation of Perception. The power of perception is one of the earliest powers developed and is synonymous with the power of observation. The child can be greatly assisted in developing this power, if parents and teachers will adhere to a few simple principles. These are:

(1) The cultivation of perception is coincident with training of the senses. This training should receive careful attention during childhood and youth, the periods in which these powers are the most active.

(2) Attention is essential to perception, and attention depends upon interest. If the child is brought in contact with his surroundings in such a manner as to have them appeal to his curiosity, he readily gives attention to those things that interest him and gains ideas for himself. See Attention; Interest.

(3) Only a very small part of a sensation is perceived at one time; hence, complete perception requires frequent repetition.

(4) Complex ideas are perceived gradually, only a part of the idea being retained with each impression. As the proper relations become established, the idea develops in the mind and finally assumes its true relation. To attempt to force this development or to expect the immediate perception of complex ideas by children leads to memorizing facts which have no meaning, and dwarfs the reason.

(5) Clear ideas are obtained only by careful observation of simple things or acts. Too many objects, the attempt to grasp too many things at once, or the use, with young children, of objects which are complex, tends to the confusion of ideas.

(6) Illusions often arise from prepossessed ideas. One thinks he sees what he expects to see, as more than half of an orange, the back side of a cube, when impartial observation shows that this is impossible.

(7) Right preparation of the mind is a great aid to perception. The skilful teacher prepares her pupils to receive the new ideas which she is to present by carefully leading up to these in such a manner as to cause the pupils to anticipate what the new lesson contains.

(8) Observation means careful, systematic looking at things. While some possess this power to a greater extent than others, it is perfected only by training.

(9) The perceptive powers should be so trained as to make them first accurate, then quick. Pupils whose powers of observation have been thus trained during the first years of their school life will readily appreciate the beauties of nature, literature, music and art.

Consult Halleck's *Education of the Central Nervous System* and *Psychology and Psychic Culture*; Baldwin's *Mental Development* and Salisbury's *The Theory of Teaching.*

Perch, *purch,* a large family of fresh-water fishes, containing nearly 100 species, which are found in both America and Europe. The best-known species is the *river,* or *yellow, perch,* common in the streams and lakes from New England and New York to the upper Mississippi valley. It is a small fish, seldom exceeding a pound in weight, and is easily caught by hook and line. Its flesh is highly esteemed, but the fish is not considered as valuable as numerous other species, because of its large number of bones.

Percussion, *pur kush'un,* in medicine, a means of determining the comparative density of different portions of the body, by tapping upon them. This method is used especially in detecting diseases of the chest and vital organs. Originally the only method employed was to tap directly upon the body, and this did not produce the satisfactory results that are now achieved by what is called the *mediate* method. In this, the stroke is not made upon the body itself, but upon a finger with its flat surface accurately fitted to the naked body, or upon some specially prepared instrument of wood, ivory or gutta-percha. Sometimes a small hammer is used in percussion. Physicians learn to recognize any departure from normal sounds, either in the chest or in the abdominal regions, and so are able to locate many times very accurately the source and extent of disease.

Perfectionists, *pur fek'shun ists,* or **Bible Communists** (popularly named *Free-lovers*), an American sect, founded in 1838 by John Humphrey Noyes. Noyes was employed as a law clerk at Putney, in Vermont, when the fierce religious revival of 1831 spread over the New England states. He gave up law for religion and soon began to teach and to preach the forming of a community where all things should be held in common, beginning with the members of his own family. The opposition in Putney to his doctrines concerning marriage broke up the community in 1847, and Noyes and his followers went to Oneida, N. Y. Here "mutual criticism" was made a form of government and a method of cure in illness. In 1879 the property of the community was valued at $600,000. They engaged in making traps, in fruit preserving, in agriculture and in the manufacture of silk thread. There was a branch community at Wallingford, Conn. Through the influence of the churches, in 1879 the community was dissolved.

Perfumes, *pur'fume'z,* substances emitting an agreeable odor, used about the person, the dress or the dwelling. Perfumes of various sorts have been held in high estimation from the most ancient times. They are partly of animal, but chiefly of vegetable, origin, and may be divided into two classes, *crude* and *prepared.* The former consist of such animal perfumes as musk, civet, ambergris and such vegetable perfumes as are obtained in the form of essential oils. The prepared perfumes, many of them known by fancy names, consist of various mixtures or preparations of odorous substances, made up according to recipe.

At the present time the manufacture of perfumes is chiefly carried on in Paris and London and in various towns near the Mediterranean, especially in the south of France. Certain districts are famous for certain productions; as Cannes, for its perfumes of the rose, tuberose, cassia and jasmine; Nimes, for thyme, rosemary and lavender; Nice, for the violet and mignonette. England claims superiority for her lavender, which is cultivated upon a large scale at Mitcham, in Surrey. The most expensive perfume in the market at present is the oil of rose petals, or attar of roses. In making this perfume, the blossoms are taken from a bushy variety of the damask rose and from the white musk rose. These roses are gathered in the latter part of May and as soon as picked are taken to the distillery and placed in large, cool cellars. About 25 pounds of fragrant blossoms are put into a tinned copper still, water is added and a fire is started in the miniature furnace underneath. When about one-fifth of the contents has been drawn over through a water-cooled worm, the still is emptied and recharged, and the process is repeated until all the harvest of roses has been used. The first product is simply rose water. This rose water is returned to the still, and about one-third of its bulk of second rose water is drawn over. Throughout this liquid, there are scattered little globules of a precious, fragrant, oily attar. The distilled water is now put into bottles, and the oil gradually comes to the top and is dipped out with a spoon. This attar is worth about $50 to $100 an ounce.

Nearly all the ordinary perfumes are made by a process known as *enfleurage.* This consists in placing freshly gathered flowers in a glass case, the lid of which has been daubed with lard to the depth of half an inch. In the course of a day the lard absorbs all the essential oils in the flowers, and they are replaced by fresh ones. When fully charged, the lard is scraped off, melted and combined with alcohol, which brings the volatile oil to the surface. It is then skimmed off and filtered and is ready to be bottled and shipped. The waste leaves from the process are used as fertilizers.

Pericar'dium, The, the closed membranous sac that envelops the heart. It is attached by its broad lower part to the upper surface of the diaphragm and is composed of two layers, an *external* one, made up of closely interlacing fibers, which at the upper end mingles its fibers with the external coats of the large blood vessels; and an *internal* serous layer, which lines the fibrous layer and also completely covers the heart. These two parts are continuous for a short distance along the great blood vessels at the base of the heart and thus form a closed sac. The bag so made contains enough fluid to prevent friction during the movements of the heart. In some diseases, especially in rheumatic fever, the pericardium becomes inflamed, and the surfaces become so rough that the friction produces a sound that can be heard.

Pericles, *per'i kleez,* (495?–429 B. C.), one of the most celebrated statesmen of Athens. He was connected by family relations with the aristocracy, but as Cimon was already at its head Pericles endeavored to gain the favor of the popular party. In this he fully succeeded, by his eloquence, abilities and political tactics, so that on the death of Cimon, in 449 B. C., Pericles became virtual ruler of Athens. By his great public works he flattered the vanity of the Athenians, while he beautified the city and employed many laborers and artists. His chief aim was to make Athens undoubtedly the first power in Greece, as well as the chief center of art and literature, and this position she attained and held for a number of years. At the commencement of the Peloponnesian War, in which Athens had to contend against Sparta and other states, Pericles was made commander in chief. The Spartans advanced into Attica, but Pericles had made the rural population take refuge in Athens, and he refused battle. After they retired he led an army into Megaris, and next year he commanded a powerful fleet sent against the Peloponnesus. In 430 B. C. a plague broke out at Athens, and for a brief period Pericles lost his popularity and was deprived of the command. The people, however, soon recalled him to the head of the State. Many of his friends and his two sons were carried off by the plague; and to console him for this loss the Athenians allowed him to legitimize his son by Aspasia. Pericles himself died a few days later. His name is intimately connected with the highest glory of art, science and power in Athens. See ATHENS; GREECE, subhead *History*.

Perim, *pa reem'*, an island in the Strait of Bab-el-Mandeb, at the entrance to the Red Sea, about 2 mi. from the Arabian shore. It has been held by Great Britain since 1867 and is under the government of Aden. It has a garrison and a lighthouse.

Pe′riod′icals, publications which appear at regular intervals, and whose principal object is not only the conveyance of news, but the circulation of information of a literary, scientific, artistic or miscellaneous character. Periodicals exclusively devoted to criticism are generally called *reviews*, and those whose contents are of a miscellaneous and entertaining kind, *magazines*; but there is no great strictness in the use of the terms.

The first periodical was published in France in 1665 and was a magazine of literary criticism, the *Journal des Savants*. It still exists, at least in name. The most famous French literary periodical is the *Revue des Deux Mondes*, begun in 1829, from 1831 issued fortnightly, and marked by an ability which has placed it in the front rank of the world's periodicals. Into it tales, poems and essays, are admitted, and the names of the contributors have to be attached to their articles.

The earliest English periodical was the *Mercurius Librarius; or a Faithful Account of All Books and Pamphlets*, begun in 1680. This was little more than a catalogue, and the first literary periodical of any importance was the *Weekly Memorials for the Ingenious*, which lasted but a year. It was followed by several other periodicals, which for the most part had but a brief existence. In the eighteenth century a number of monthly reviews and periodicals of more frequent publication appeared in England. A distinctive feature of some of these periodicals was the essay which appeared in each issue, and which was carried to a point of great excellence by Addison and Steele in *The Tatler* and *The Spectator*. Among the most important magazines established during the eighteenth century were the *Edinburgh Magazine*, the *Oxford Magazine*, the *Monthly Magazine* and the *Monthly Review*. Early in the nineteenth century was established the *Edinburgh Review*, which numbered among its contributors Scott, Carlyle, Hazlitt and Macaulay; a few years later the first number of *The Quarterly Review* appeared, and this was followed by the *Westminster Review* and the *Fortnightly Review*. Among magazines of the first half of the nineteenth century the most noteworthy were *Blackwood's Edinburgh Magazine*, *Fraser's Magazine* and *Bentley's Miscellany*; while of those established later may be mentioned *Macmillan's Magazine*, *The Cornhill Magazine*, *The Strand Magazine* and *The Pall Mall Magazine*.

The earliest periodical established in the United States was *The American Magazine*, first issued in 1741. Three days after the appearance of its first number, Benjamin Franklin put forth the first issue of his long-planned *General Magazine*. Periodical literature rapidly increased in the United States, emphasis being placed from the first on magazines, rather than on reviews. At the present time the most important magazines in the United States are *The Atlantic Monthly*, *Harper's Monthly Magazine*, *Scribner's Magazine*, *The Century Magazine*, *Lippincott's Magazine*, *McClure's Magazine*, *The Cosmopolitan*, *The American Magazine* and *Everybody's Magazine*. Of reviews the most noteworthy are *The North American Review*, *The Arena*, the *Review of Reviews*, *World's Work* and *The Forum*.

Per′ipatet′ic School of Philosophy, the system of philosophy of Aristotle and his followers, so called, it is believed, because he was accustomed to walk up and down with his more intimate disciples, while he expounded to them his doctrines. Practical philosophy is divided by Aristotle into ethics, economics and politics. According to his ethical system, the highest good is happiness, which depends on the rational or virtuous activity of the soul throughout life. Virtue is proficiency in willing what is conformed to reason. All virtues are either ethical or intellectual. The former include justice, or righteousness, generosity, temperance and bravery, the first being the highest. The intellectual virtues are reason, science, art and practical intelligence. For the attainment of the practical ends of life, it is necessary for a man to live in society and form a State.

The Peripatetic School continued at Athens uninterruptedly till the time of Augustus. Those who proceeded from it during the first two or three centuries after Aristotle's death abandoned, for the most part, the metaphysical side of his teaching and developed chiefly his ethical doctrines or devoted themselves to the study of natural history. No other one of the philosophical schools of antiquity maintained its influence so long as the Peripatetic. See Aristotle; Philosophy.

Per′itone′um. See Abdomen.

Perjury, *pur′ju ry,* the act or crime of wilfully making a false statement under oath or affirmation, in judicial proceedings, in a matter material to the issue or cause in question. If a witness wilfully makes a statement about a matter of which he knows nothing, the act is sometimes accounted perjury. Perjury is a misdemeanor punishable by fine or imprisonment, or both. The testimony of one reliable witness, besides other corroborating evidence, is usually enough to convict.

Pernambuco, *per nam boo′ko,* a town in Brazil, capital of the State of Pernambuco, on the Atlantic coast. It consists of three distinct parts, Recife, the oldest part, occupying a small peninsula; São Antonio, on an island, and Boa Vista, on the mainland. Recife is the principal seat of business; São Antonio has most of the public buildings, and Boa Vista is the fashionable residence quarter. The harbor of the city is protected by a reef, which encloses a belt of water about a mile in breadth. Many of the buildings of the city are worthy of note. The trade is extensive. The principal exports are sugar, cotton, dyewoods, rum, alcohol and hides. The manufactures include cotton, machinery, glass and leather, but they are not yet of great importance. Pernambuco is now the third largest city in Brazil and the second in point of commercial importance. It was founded by the Portuguese in the sixteenth century and from 1630 to 1654 was in the hands of the Dutch. Population in 1900, estimated at 120,000.

Perox′ide of Hy′drogen. See Hydrogen Dioxide.

Perpendic′ular, the name applied to the style of Gothic architecture common in England in the last half of the fifteenth and the first of the sixteenth century. The name is derived from the use of stiff and rectilinear lines, which were exhibited most clearly in the windows. The tracery was usually in straight lines, and horizontal bars crossed the mullions. Fan tracery was a peculiar feature of this style (See Fan Tracery). The best specimens of this style of architecture are Henry VII's chapel at Westminster and colleges at Oxford and Cambridge.

Perpignan, *pair pe nyahN′,* a town of southern France, capital of the Department of Pyrénées-Orientales, on the Tet River, about 5 mi. from the Mediterranean. Guarding, as it does, the entrance from Spain into France by the East Pyrenees, it is strongly fortified by a citadel and other works and ranks as a fortress of the first class. The principal building is the cathedral, begun in the thirteenth century. The manufactures of the city include textiles, paper, chocolate, corks and furs. Perpignan was formerly the capital of the County of Roussillon and was not made a part of France until the Treaty of the Pyrenees, in 1659. Population in 1901, 36,157.

Perry, Okla., the county-seat of Noble co., 30 mi. n. e. of Guthrie, on the Atchison, Topeka & Santa Fé railroad. The city has a valuable trade in grain, live stock and other produce with the surrounding agricultural region. The principal manufactures are flour, feed and cigars. A United States land office is located here, and there are several public parks. Population in 1900, 3351.

Perry, Matthew Calbraith (1794–1858), an American naval officer, brother of Oliver H. Perry. He was born at Newport, R. I., entered the navy at the age of fifteen and served during the War of 1812. After engaging for a time in mercantile service, he reëntered the navy and was given command of unimportant expeditions against West Indian pirates. He was promoted to the rank of commander in 1826 and, in charge of the Brooklyn Navy Yard, superintended the construction of the *Fulton,* the first steam vessel in the United States navy. He was placed in command of the vessel when it was completed and in 1841 was made commodore and was assigned to command of the fleet for the suppression of the African slave trade. He commanded for a time the American fleet in the Mexican War. In 1852 he accomplished his most notable service, in command of an expedition to Japan, where he succeeded in negotiating the treaty by which that country entered into commercial relations with other nations. He was the first American to circumnavigate the globe.

MATTHEW C. PERRY

Perry, Oliver Hazard (1785–1819), an American naval officer, born at South Kingston, R. I. He is famous chiefly for his defeat of a British force on Lake Erie in 1813. Perry, who had nine vessels, with fifty-four guns and four hundred ninety officers and men, fought six vessels, with sixty-three guns and about four hundred sixty officers and men. He lost four-fifths of the crew of his flagship, but finally won a complete victory, which he announced in the brief dispatch, "We have met the enemy and they are ours—two ships, two brigs, one schooner and one sloop." As a reward for this victory he was given a gold medal and the rank of captain. He died of yellow fever in Trinidad and was buried there, but some years later his body was carried to Newport, R. I., where there is a bronze statue of him.

Per'ryville, Battle of, a battle fought at Perryville, Ky., October 8, 1862, between a Federal force of 22,000, under General Buell, and a Confederate force of 17,000, under General Bragg. The Confederates opened the battle by an attack upon the left wing of the Federal army, under McCook, and were at first successful, but were finally driven back. They retired during the night. Though in many respects a drawn battle, this engagement was practically a victory for the Federals. The Confederate loss was about 3500, while the Federal loss was about 4200.

Persephone, *per sef'o ne.* See Proserpina.

Persep'olis, a Persian city of great antiquity, famous for its magnificent ruins. It was situated in a fertile valley, about 30 mi. n. e. of Shiraz, was one of the capitals of Persia and is the burial place of many of the Persian monarchs. The remains of huge marble columns, vast portals, walls, bas-reliefs and sepulchers prove the former magnificence of its palaces and temples. The city became the capital of Persia under Darius I. It came into the hands of Alexander after the Battle of Gaugamela, in 331 B. C.

Perseus, *pur'se us,* an ancient Greek hero, son of Jupiter and Danäe. Danäe's father, Acrisius, king of Argos, had been told by the priests that he was to die at the hand of his grandson, and in an attempt to ward off this fate he shut his only daughter up in a tower, about which he set guards. Jupiter, however, seeing from Olympus the maiden's beauty and loneliness, made his way to her in a shower of gold and won her for his wife. When Acrisius was informed of the birth of Perseus, he was exceedingly angry, but, unwilling to have the boy put to death, he set Danäe and the child afloat on the sea in a cask. They floated safely to the island of Seriphos, and here they were taken ashore and treated kindly. As Perseus grew up, however, Danäe was much troubled by Polydectes, the king of Seriphos, who wished to marry her, and who, in order to be rid of Perseus, sent him on a quest to kill the Gorgon Medusa. Aided by Mercury, who lent to him his winged sandals, and by Minerva, who furnished him with a helmet which made him invisible and with her famous shield, Perseus succeeded in killing Medusa. After various adventures, chief of which were the rescue of Andromeda from a sea monster and the transformation of Atlas into a mountain, by showing him the Gorgon's head, Perseus arrived in Seriphos. Finding that his mother had been much persecuted by Polydectes during his absence, he revenged himself on the king by showing him the Gorgon's head, which turned him to stone. With his mother and his wife, Andromeda, he then returned to Argos. One day, while engaged in a game of quoits, he accidentally killed his grandfather, thus fulfilling the early prophecy.

Persia, *pur'sha* or *pur'zha,* a kingdom of southwestern Asia, called *Iran* by the inhabitants. It is bounded on the n. by Transcaucasian Russia, the Caspian Sea and Russian Turkestan; on the e. by Afghanistan and Baluchistan; on the s. by the Indian Ocean and the Persian Gulf, and on the w. by Asiatic Turkey and the Persian Gulf. Its greatest length, from northwest to southeast, is 1400 mi., and its area is about 628,000 sq. mi. The population is over 9,000,000.

Surface and Drainage. Persia may be considered as an elevated plateau, broken by clusters of hills or chains of rocky mountains, which alternate with extensive plains and barren deserts. Low tracts exist on the Persian Gulf and the Caspian. The interior plains have an elevation of from 2000 to 6000 feet above the sea. This vast central plateau is supported in the north and south by two great mountain chains or systems, and from these all the minor ranges seem to spring. The northern chain, an extension of the Hindu Kush, enters Persia from northern Afghanistan and reaches its greatest elevation on the south of the Caspian, where it takes the name of the Elburz Mountains and attains, in Mount Demavend, a height of about 18,500 feet. The other great mountain system runs from northwest to southeast nearer the Persian Gulf, is of considerable width and forms several separate ranges. The rivers are few and insignificant. Not one of them is of any navigable importance except the Euphrates, which waters only a small portion of the southwest frontier, and the Karun, recently opened to the navigation of the world. There are a great number of small fresh-water lakes, and a few very extensive salt lakes, the largest being Urumiah, in the extreme northwest.

Climate. The climate varies considerably in different provinces, and in the central plateau intense summer heat alternates with extreme cold in winter. The shores of the Persian Gulf are scorched in summer; those of the Caspian Sea, especially the parts covered with dense forest, are humid and are noted for malaria.

Mineral Resources. The mineral wealth of Persia is but little developed. Iron, copper, lead and antimony are abundant, sulphur, naphtha and rock salt are found, and coal also exists. The turquoise mines of Nishapur are the only mines receiving anything like adequate attention.

Industries. In the level and rich plains, the sugar cane and orange come to perfection; the pomegranate grows wild; the cotton plant and mulberry are extensively and successfully cultivated, and large tracts are occupied by the vine and by orchards producing every kind of European fruit. In the low plains, the only grain under extensive and regular culture is rice; the principal subsidiary crops are cotton, indigo, opium, sugar, madder and tobacco. Excellent dates are produced on the southern coast tracts. Irrigation is well understood and extensively practiced.

Animal products constitute a large part of the wealth of Persia. The domestic animals are sheep; goats, some of which produce a wool little inferior to that of Cashmere; asses and mules of a large and superior description; horses of Arab, Turkoman and Persian breeds, and camels. The manufactures of Persia were once celebrated, but excepting some carpets and shawls, it may be said that the country has ceased to export manufactured articles. Its chief exports now are rice, dried fruits, opium, silk, wool, cotton, hides, pearls and turquoises.

Transportation and Communication. The internal trade of the country is almost entirely carried on by caravans. In 1888 the first Persian railway was opened, connecting the Caspian with Teheran. A projected railway includes a line from Resht to Teheran, with ultimate extension to the Persian Gulf. There are about 5990 miles of telegraph lines in operation.

Inhabitants. The population is chiefly made up of Iranians, or pure Persians, and Turanians (Turkish and Tartar tribes). Education is comparatively well attended to, Persia being considered, next to China, the best educated country in Asia. See Races of Men, *color plate, Mongolian Types,* Fig. 1.

Government. The government of Persia is an absolute monarchy. The only control to which its ruler, the shah, is subject is the precepts of the Koran. He surrounds himself with a certain number of advisers, forming a ministry. These ministers he calls and dismisses at pleasure. By far the greater number of the inhabitants are Mohammedans.

Cities. The chief cities are Teheran, the capital; Tabriz, Ispahan, Meshed, Kerman, Yezd and Resht.

History. The Persians are descended from

Aryan stock, and from the most ancient times of which we have any record they have inhabited the southwestern part of the plateau of Iran, anciently known as Persis. In the ninth century B. C. they were first conquered by the Assyrians and forced to pay tribute. In 660 B. C., when the Assyrians were overcome by the Medes, the allegiance of Persia was transferred to Media.

About 550 B. C. Cyrus the Great conquered the king of Media, and Persia became the mistress, instead of the vassal, of Media. From this time on, the Medes and Persians are spoken of as one people. Cyrus continued his conquests and built up an empire which extended from the Oxus and Indus to the Mediterranean. He was succeeded by his son, Cambyses II (529–522 B. C.), who subdued Tyre, Cyprus and Egypt. Darius I, who ascended the throne in 521 B. C., organized the kingdom and divided it into twenty states, each governed by a satrap, who was appointed by the king. The capital of the Empire was fixed at Susa. The Grecian colonies in Asia Minor had fallen into the hands of Cyrus, and it was Darius's plan to subjugate Greece herself (See GREECE, subhead *History*). To this end he sent two great expeditions against Greece, but they were both fruitless, the second ending in his defeat at the famous Battle of Marathon (490 B. C.). Darius died in 486 B. C. and was succeeded by his son, Xerxes I, who carried on his father's plans against Greece. Assembling over a million soldiers, he marched at their head to the Hellespont. At the pass of Thermopylae his march was checked by the Spartan Leonidas, with seven thousand Greeks. Leonidas and all his men fell at the hands of the Persians, and Xerxes advanced successfully to the plains of Greece. Nothing but defeat awaited him there, and the battles of Salamis, Plataea and Mycale banished all hopes of Persian supremacy in Greece.

Persian history during the next century is a record of internal strife. The most noteworthy event was the attempt of Cyrus the Younger (401 B. C.) to seize the throne of his brother Artaxerxes. Finally, in 330 B. C., the Empire fell before Alexander the Great. After his death, Persia passed successively into the hands of the Seleucidae, the Sassanians, the Arabs and the Seljuks. The dynasty of the Seljuks was swept away by the Mongols under Genghis Khan, in 1223 A. D. His grandson Hulagu Khan founded the Perso-Mongol dynasty, which, in 1380, gave way before Timur (Tamerlane) the Tartar. After Tamur's death the Turkomans were masters of the country for one hundred years.

In 1500 Ismail Safi, who pretended to be descended from Ali, the son-in-law of Mohammed, at the head of a force of Turkish tribes overthrew the Turkomans and made himself ruler of Persia, assuming the title of shah. Shah Ismail and his descendants were constantly obliged to protect Persia from the sultan of Turkey. In 1795 Agha Mohammed, a Turkoman, founded the present dynasty of Persian rulers. In 1797 Agha was succeeded by his nephew, Futteh Ali, who, soon after his accession, became involved in a war with Russia. By the Treaty of Gulistan (1813), Persia ceded several provinces to Russia and granted her the right of navigation in the Caspian Sea. In 1826 another Russian war broke out. Persia was again defeated and was compelled to cede Armenia to Russia. Futteh Ali died in 1834 and was succeeded by his grandson Mehemet Shah, during whose reign the country grew constantly weaker and came more and more under Russian influence. When, at Mehemet's death in 1848, Nasr-ed-Din came to the throne, he found the country in confusion; but he established himself firmly and planned a policy of expansion. Against the Turkomans and several neighboring tribes he was successful, and he asserted the claims of Persia in Afghanistan and Baluchistan. The English government objected to this expansion of territory and compelled him to sign an agreement not to interfere in the affairs of these countries, putting a stop to whatever thoughts of further conquest he may have entertained. In 1896 he was fatally shot by a religious fanatic and was succeeded by his son Muzaffar-ed-Din. Muzaffar-ed-Din did away with the office of grand vizier and, assuming control of his cabinet of twelve ministers, at once proposed energetic reforms, some of which were carried out. The taxes on foods were reduced, the civil service was reformed, and revolts and conspiracies were sternly repressed. Muzaffar-ed-Din was succeeded in 1907 by Mohammed Ali Mirza.

Persian Gulf, a gulf separating Persia from Arabia and communicating with the Arabian Sea by the Strait of Ormuz. Its greatest length is 520 miles, its average breadth, about 180. It receives the waters of the united Tigris and Euphrates and of a number of small streams. There are many islands in the gulf, the largest of which are Kishm, Ormazd and the Bahrein islands. In the neighborhood of the latter there are important pearl fisheries.

Persian Wars. See GREECE, subhead *History*; PERSIA, subhead *History*.

Persian Wheel or **Noria,** a machine for raising water for irrigation. It has been employed from time immemorial in Asia and Africa and was introduced by the Saracens into Spain and other European countries. It consists of a double water wheel, with float boards on one side and a series of buckets on the other, which are movable about an axis. The wheel is placed in a stream, the water turns it and the filled buckets ascend; when they reach the highest point, their lower ends strike against a fixed obstacle, and the water is discharged into a reservoir. In Portugal, Spain, southern France and Italy, this wheel is extensively used and has been modified to enable it to draw water from ponds and wells, animals supplying the motive power, and pots and leather or other bags taking the place of buckets. See IRRIGATION.

Persim′mon, the date plum of America, the fruit of a tree growing in the Southern states, where it attains the height of sixty feet or more. The fruit is succulent, reddish and about the size of a small plum, containing a few oval stones. It is powerfully puckery when green, but when fully ripe the pulp becomes soft, palatable and very sweet.

Personal Property or **Per′sonalty,** in general, in law, things movable or temporary, as money, jewels, furniture, distinguished from things fixed or immovable, which constitute *real property,* in a general sense, as estates in land and its fixtures. Specifically, in law, the only firm distinction between real and personal property is the disposition after death, the former being inheritable, the latter being at the disposal of the administrator. Title to personal property can usually be transferred by agreement of the parties. See CONTRACT; REAL PROPERTY.

Perspec′tive, the art or science which teaches how to represent objects on a flat surface so that they appear as though they themselves were viewed from a given point. Perspective is intimately connected with all art in general and is particularly important in the art of painting, as without correctness of perspective, no picture can be entirely satisfactory. That part of perspective which relates to the form of the objects differs essentially from that which teaches the gradation of colors according to the relative distance of objects. A person looking through a glass window at objects without, will perceive the shape, size and location of every object upon the glass. If the objects are near the window, the spaces they occupy on the glass will be larger than those occupied by similar objects at a greater distance. If they are parallel to the window, their shapes upon the glass will be parallel, likewise; if they are oblique, their shapes will be oblique, and so on. As the person alters his position, the location of the objects upon the window will be altered, also. The horizontal line, or line corresponding with the horizon, will in every position of the eye be upon a level with it, that is, will seem to be raised as far above the ground upon which the spectator stands as his eye is. Now, if the person at the window draws with a pencil upon the glass, the figure of an object seen through it, as if the point of the pencil touched the object, he will have a true representation of the object in perspective as it appears to his eye. Representations of objects have, however, generally to be drawn on opaque planes, and for this purpose rules have been deduced from optics and geometry, and the application of these rules constitutes what is properly called the art of perspective.

Perth, *purth,* the capital of Western Australia, situated on the Swan River, 12 mi. above its port, Freemantle. The chief buildings include a city hall, the governor's palace, a mechanics' institute and an observatory. The city also has barracks and a large park. The population of the city proper in 1901 was 27,553; in 1903, including suburbs, estimated at 44,373.

Perth Amboy′, N. J., a city in Middlesex co., 15 mi. s. of Newark, on Raritan Bay, at the mouth of the Raritan River, and on the Central of New Jersey, the Lehigh Valley, the Pennsylvania and other railroads. It was settled by people from Scotland about 1683, on the site of an indian village called Amboy. They named the place Perth in honor of the Earl of Perth, and the indian name was added later. It was the capital of the Province of New Jersey up to the Revolution. There is an excellent harbor and considerable shipping, especially of coal. In the vicinity are deposits of fire clay, and the city has extensive shipbuilding yards, large smelting and refining plants, and brick, terra cotta and steel works, railroad shops and other factories. The municipality has a public library, the city hall park, a high school and three banks, and it owns and operates the waterworks. Population in 1905, 25,895.

Perturbations, *pur′tur ba′shunz,* the deviations of the planets from their regular elliptical orbits. These deviations arise, in the case of the primary planets, from the attraction of these planets upon one another. In the secondary planets the cause is partly the mutual gravitation of the secondaries of the same system and partly from the unequal attraction of the sun on them and on their primary.

Peru′, a republic of South America, lying between 3° 25′ and 18° south latitude, and 70° and 81° 25′ west longitude. It is bounded on the n. by Ecuador and Colombia; on the e. by Brazil and Bolivia; on the s. by Bolivia and Chile, and on the w. by the Pacific Ocean. Its length from north to south is about 1100 mi.; its greatest breadth, 800 mi., and its area, 695,700 sq. mi., or nearly two and one-half times the area of Texas.

SURFACE AND DRAINAGE. Two ranges of the Andes Mountains traverse the country from northwest to southeast and divide it into three physical regions. The first is the coast region, with an average breadth of 20 miles, which is mostly a desert. The second is the interior plateau and mountain region, generally known as the Sierra, consisting of a broad plateau, upon which the ranges and spurs of mountains rest. These are interspersed by high valleys and deep ravines. The loftiest summits are in the south, and many of them rise above the snow line, several attaining an elevation of 20,000 feet or more. While much of this region is cold and barren, in the main it is the home of the greater part of the population of the country. To the east of the mountains is the third region, known as the Montaña, a tropical region, well watered and densely wooded. This slopes from the foothills of the Andes to the low plains of Brazil and is by far the most fertile portion of the country.

The rivers of the coast region are short, rapid, unimportant and unsuited to navigation, but their water is used in irrigating the land adjoining their banks, and each river valley is clothed with abundant vegetation. The other streams rising in the valleys between the Andes or on the eastern slope take a northward direction and unite directly with the Amazon or with some of its tributaries. In the northern part of the country are the head waters of the Amazon, which is known as the Marañon until it is joined by the Ucayali, the great river of eastern Peru. Lake Titicaca, in the extreme southeast, lies partly in Peru and partly in Bolivia.

CLIMATE. Along the coast the climate is hot, dry and somewhat unhealthful, but in the uplands of the interior it is mild and salubrious, the temperature at Lima in summer ranging from 80° to 84° and in winter from 60° to 64°, while on the eastern slope the temperature ranges from temperate to tropical, and the rainfall is heavy. The highest altitudes have a cold climate. The peculiarity of the rainfall is due to the fact that Peru lies in the path of the trade winds, which bring an abundance of moisture from the Atlantic. The eastern slope of the mountains robs the winds of most of this; however, some reaches the intervening valleys, while the western slope has scarcely any, the annual precipitation there being less than five inches.

MINERAL RESOURCES. The country is rich in minerals and, for a long time after it was discovered by the Spaniards, mining was the chief industry and the great source of wealth. Gold is quite generally distributed over the country. Copper is found along the coast, and there are large deposits of lead, bismuth and tin, but silver is the most important metal and is widely distributed, the chief mines being those of Cerro de Pasco. Coal measures are found in the central part of the country and have been worked to some extent; but on the whole, the mining industry is in a backward state, and only small returns are received from the labor and capital invested. This is largely due to the lack of transportation facilities.

AGRICULTURE. In the valleys and uplands the soil is highly fertile, and wherever sufficient moisture can be obtained abundant crops are raised. In the lowlands the chief crops are sugar cane, coffee and cotton, the first being considered the staple and affording the most valuable agricultural product for export. The cotton is specially valuable for mixing with wool, and in fineness and strength the fiber is second only to the sea-island cotton of the United States (See COTTON). In the higher lands grains common to the temperate regions are raised. Fruits also are cultivated, and the manufacture of wine is becoming an important industry. The eastern part of the country is covered with dense forests, and its most important exports are forest products, consisting of rubber, cinchona, dye stuffs, medicinal drugs and, in the cultivated portions, cocoa, which is raised in large quantities.

The manufacturing industries are few and of little importance. There are a few cotton factories in the larger towns; some clothing, furniture, boots and shoes, soap, lard, olive oil and cottonseed oil cake are manufactured. The indians are noted for their skill in the manufacture of straw hats, which are sold as Panama hats, though they are made of a different fiber from the Panama hats of Ecuador.

Transportation and Commerce. Callao is the principal seaport and is entered by steamers that ply regularly between South American and European ports and between South American ports and those of the United States. The country has over 1000 miles of railroad in operation. These lines connect interior towns with some seaports. They have but few branches and are separate from each other, so that the country lacks a railway system. A line connecting Lima and Oroya crosses the Andes at an elevation of 15,645 feet and forms a part of the great trans-Andean railway system. Carriage roads are few and poor, and most of the inland transportation is by pack animals, llamas being employed to a large extent. All products of the eastern part of the country are exported by way of the Amazon.

Sugar is the chief article of export, followed by minerals, then by cotton and rice. Other articles of considerable importance are leather, wool and coffee. The imports consist almost entirely of machinery and manufactured goods. The foreign trade is with the United Kingdom, Germany, the United States, France and Chile, the countries being named in the order of their importance.

Government and Religion. The country is a republic, and its present constitution quite closely resembles that of the United States. The executive power is vested in a president, who, with two vice-presidents, is elected by popular vote for four years. The president is assisted by a cabinet of six ministers. The legislative power is vested in a Senate of 48 members and a Chamber of Deputies of 108 members, elected by popular suffrage and apportioned among the political divisions according to population. The senators are elected by provincial electoral colleges and serve six years. The Roman Catholic Church is the State Church, and the public exercise of any other religion is prohibited by the constitution; however, there are a few Protestant churches and mission schools in the country.

Inhabitants. More than one-half of the inhabitants are indians. About one-fourth consist of races of mixed blood, which have arisen from the intermarrying of Europeans with indians or negroes with indians. The proportion of negroes is small, as is that of Chinese. Spanish is the language in general use.

Education. Free public schools are maintained by the municipalities, and theoretically attendance is compulsory, though the law is not strictly enforced. High schools are maintained by the government in the capitals of the various departments, and the University of San Marcos has departments of law, literature, theology, medicine and political science. There are also small universities at Arequipa, Cuzco and Trujillo, and a school of mines and engineering is located at Lima

Cities. The chief cities are Lima, the capital; Callao, Arequipa and Cuzco, each of which is described under its title.

History. Peru was the center of a vast empire ruled by the Incas, who, previous to their conquest by the Spaniards, extended their sway over a large part of what is now Chile, Bolivia, Ecuador, Brazil and northern Argentina. Owing to internal dissensions, the Incas were easily conquered by the Spaniards early in the sixteenth century, and Peru became a Spanish colony. The early Spaniards abused the natives in a most cruel manner, until the sufferings of these unfortunate people caused the home government to take action in their behalf, when a more humane policy was instituted. During the sixteenth and seventeenth centuries, the colony of Peru, together with other South American colonies, was torn by dissensions between contending rulers and factions. In 1718 the Province of Quito was separated from Peru, and sixty years later a large portion of the southern territory was added to the government of Buenos Ayres. In 1816 Peru attempted to gain her independence, but was not successful. However, with the assistance of English volunteers and troops from Chile and other South American countries, she succeeded in 1821. From that time to 1883 the country was frequently involved in war with adjoining states or was torn by civil dissension. The last wars with Chile and Bolivia were particularly disastrous, since Peru was enabled to make peace only by ceding considerable territory. Boundary lines between the country and Bolivia are still unsettled and remain as a possible source of future difficulty. Since the last struggle the country has been comparatively peaceful and prosperous. Population, about 4,500,000.

Peru, Ill., a city in La Salle co., 60 mi. n. e. of Peoria, on the Illinois River, at the head of navigation, on the Illinois & Michigan Canal and on the Chicago, Burlington & Quincy and the Chicago, Rock Island & Pacific railroads. It has a picturesque location and contains a public square and public parks. Saint Bede College is located here, and other prominent buildings are the Turner Hall and the Masonic Temple. Peru is near deposits of bituminous coal, white sand rock and cement rock, and it has a foundry, a machine shop, a planing mill and manufactures of scales, clocks, implements and various other articles. In the vicinity are interesting relics of the mound builders. The place was settled in 1827 and was chartered as a city in 1852. Population in 1900, 6863.

Peru, Ind., the county-seat of Miami co., 75 mi. n. of Indianapolis, on the Wabash River and on the Lake Erie & Western, the Wabash and other railroads. The city has a considerable trade with the surrounding agricultural region, and contains railroad shops, electric, carbon and steel works, candy factories, woolen mills and other works. Peru has a public library, Boyd Park, a sanatorium and the Wabash Railroad Hospital. It was incorporated in 1848. Population in 1900, 8463.

Perugia, *pȧ roo'ja,* a city of central Italy, situated 48 mi. s. e. of Arezzo and 10 mi. e. of the Lake of Perugia, on the southern slope of the Apennines. It is of interest because of its historical associations. It has a university, founded about the middle of the thirteenth century, and contains a number of museums and antiquities. There are ruins of works built by the Etruscans and the Romans. At the height of its prosperity, Perugia was one of the twelve cities of the Etruscan League. Later it came under the rule of the Romans, and before the Middle Ages it became a possession of the popes. The present town is comparatively unimportant. Population in 1901, 20,580.

Perugino, *pa roo je'no,* Pietro Vannucci (1446–1523), one of the chief masters of the Umbrian School of painting, born at Citta della Pieve. His most important work was *The Delivery of the Keys to Saint Peter.* About 1480 Pope Sixtus IV called him to Rome, where he was employed with other famous artists in decorating the Sistine Chapel with frescoes. Fine specimens of his frescoes are preserved in Perugia, Rome, Bologna and Florence, and specimens of his other works are not infrequent in European galleries.

Peru'vian Bark, the bark of various species of trees of the genus *Cinchona,* found in many parts of South America, but more particularly in Peru. It was formerly called *Jesuits' bark,* from its having been introduced into Europe by Jesuits. Its medicinal properties depend upon the presence of *quinine,* which is now extracted from the bark, imported and prescribed in place of nauseous mouthfuls of bark. See Quinine.

Peseta, *pa say'ta.* See Franc; Money.

Peshawar or **Peshawur,** *pe shah'wur,* a town of India, capital of the Northwestern Frontier Province, 12 mi. e. of the Khyber Pass. It covers a large area, is irregularly built and is surrounded by a mud wall. It has several good mosques, but few interesting or striking buildings. Lying in the route from Bokhara and Cabul to India, it has an important trade. Population in 1901, 95,147.

Peso, *pa'so,* the monetary unit of several Central and South American nations, and formerly of the Philippine Islands, varying in value from 41 cents to $1.03. It is usually divided into one-hundredth parts known as *centimos, centimes* or *centavos,* and coins in multiples of the unit and of these subdivisions are also issued. See Money.

Pessimism, *pes'i miz'm,* a view of life which, opposed to optimism, is peculiar to those who believe that evil overrules good in the government of the world. The advocates of this doctrine find its chief justification in what they consider the unmerited and unreasonable suffering that forms so large a part of common experience. Though ordinarily regarded as merely the product of morbidness, pessimism is, in its deepest expression, a craving for a life that is more than finite and mortal. This view of life is developed and systematized in the philosophy of Schopenhauer. Pessimism, like optimism, to a greater or less extent influences every one's life. A *pessimist* is one who habitually looks upon the dark side of life and sees little or no good in anything. See Optimism.

Pestalozzi, *pes ta lot'se,* Johann Heinrich (1746–1827), a Swiss educator and reformer, born at Zurich, where he was educated at the university. Early in life he became acquainted with the wretchedness of the lower classes, and after failing in several occupations, he decided to devote his life to the work of a teacher. He opened his house at Neuhof to the children of the poor, and in addition to the instruction of the home, he used his farm as a means of giving them industrial training. However, his efforts were not appreciated, and his enterprise failed for want of proper support. But his experience had made him so thoroughly acquainted with the conditions of society that he resolved to continue the work. About this time he published *Leonard and Gertrude,* a work in which he set forth his ideas of education. This was attractive in style and explained his principles and their necessity so clearly that it gave Pestalozzi a wide reputation, and he was invited to reside at the courts of several different countries.

In 1798 he opened a school at Stanz for orphan children who had been deprived of their homes through the French invasion of Switzerland. Within a few months, however, the military situation compelled him to abandon the school, and he removed to Bergdorf, where he opened a tuition school, which was later removed to Yverdun. It was in this school that Pestalozzi established his reputation as an educational reformer. Here he gathered about him pupils from nearly every country of Europe and from the United States. Such was the reputation of his school that it was visited by the rulers and leading educators of the world. However, he was not a good administrator, and within a few years dissensions arose among the faculty, which caused the school to lose its influence, and finally Pestalozzi was obliged to give it up. He died in comparative poverty.

The value of Pestalozzi's work as an educator consists largely in the principles which he set forth and attempted to put into practice. He believed that the principles of education were to be found in human nature, and that this nature consisted of physical, intellectual and moral capabilities, all of which should be trained. He also believed that it was the duty of the teacher to remove obstructions from the way of his pupils and to stimulate them in the exercise of all their powers. He was a strong advocate of education through observation, or the cultivation of the senses, and believed that all knowledge began in this way, and that the child should acquire his ideas through his own activity, under the direction of the teacher. He was a strong advocate of industrial education and believed that it should go hand in hand with intellectual and moral training. The soundness of his principles is shown from the fact that they now form the basis of instruction in the normal schools of Europe and the United States. Consult De Guimps's *Pestalozzi; His Life and Work.*

Petchora, *pa cho'ra,* a river of Russia which rises in the Ural Mountains, in the north of the Government of Perm, and after a course of about 1000 miles, falls into the Arctic Ocean by a number of mouths. It is navigable for almost its entire length.

Peter or **Simon Peter,** one of the apostles of Jesus, generally considered the leader of the twelve. But little is known of his early life. Previous to his call by Jesus, he, with his brother Andrew, was a fisherman on the Sea of Galilee. Both were attracted by the preaching of John the Baptist and followed him; afterwards they returned to their ordinary occupation until called by Jesus, when they gave up their calling and devoted the remainder of their lives to the propagation of the Gospel. During Jesus's brief career upon earth, Peter was one of his most devoted followers, and after the ascension he was recognized as the leading spirit in the movement to spread Christianity. A comparatively full account of his activities is found in the *Acts of the Apostles.* He is also the author of two books of the New Testament, the *First Epistle General of Peter* and the *Second Epistle General of Peter.* But little is known of his last years. He is supposed to have been put to death by crucifixion at about the same time that Saint Paul was executed.

Peter I, Alexeyevitch (1672–1725), emperor of Russia, known as Peter the Great. In 1682, on the death of his brother Feodor, Peter was declared czar; but his half-sister Sophia, ambitious to govern, succeeded in having her brother Ivan proclaimed czar jointly with Peter, with herself as regent. Peter was relegated to private life, his education was purposely neglected and his bad habits were encouraged. In 1689 he wrested the power from his sister and confined her in a convent. Peter was then virtually sole emperor, though, till the death of his brother, in 1697, he associated Ivan's name with his own in the decrees of the Empire.

PETER THE GREAT

He then determined to do what he could to raise his country out of its barbarism and to place its people in the ranks of civilized nations.

His journey to Holland and England, when he worked at several humble trades, brought him knowledge by which he amply profited on his return. He not only created a navy, but gave Russia a seaboard and seaports by wresting the Baltic provinces from Charles XII of Sweden. Young Russian nobles were obliged to travel to acquaint themselves with the customs of other countries; schools of navigation and mathematics were founded; agriculture was improved by the introduction of implements, seeds and superior breeds of cattle. Peter imported foreign artisans of all kinds, established manufactories of arms, tools and fabrics and improved the roads and canals throughout the country. In 1703 he laid the foundation of Saint Petersburg, and twenty years later, of its Academy of Sciences. Laws and institutions which in any way interfered with his projects he either abolished or altered. In his zeal to do good he was frequently injudicious in choosing times and seasons, and the least show of opposition irritated him into ferocity. He repudiated his wife a few years after marriage, for her reactionary leanings, and for the same reason his son Alexei was ill treated, compelled to renounce the succession and condemned to death. He was later pardoned, but died suddenly as a result of the treatment he had received. Peter married, in 1712, his mistress, Catharine, who was crowned in 1724 and who succeeded him as Catharine I.

Peter I, KARAGEORGEVITCH (1846–), king of Servia, the grandson of the famous Black George, the leader of the Servians in their attempt to free themselves from Turkish rule. After many years spent in the army and in adventurous roving about Europe, he settled in Switzerland, where he lived quietly until 1903. In that year, four days after the murder of King Alexander of Servia, he was proclaimed king.

Peterborough, a city of Canada, in the Province of Ontario, capital of Peterborough co., on the Otonabee River and on the Grand Trunk and the Canadian Pacific railroads. It is about 94 miles northeast of Toronto. It is a well-built city, with good water power, and it has manufactures of machinery, agricultural implements, wooden ware and iron castings. Its trade is large, especially in grain, pork and lumber. Population in 1909, 17,000.

Petersburg, VA., a city at the junction of Chesterfield, Dinwiddie and Prince George counties, 22 mi. s. of Richmond, on the Appomattox River, on the Upper Appomattox Canal and on the Norfolk and Western, the Atlantic Coast Line and the Seaboard Air Line railroads. The place was settled in 1733 on the site of an indian village destroyed in the seventeenth century. It was incorporated as a town in 1748 and as a city in 1850. During the Revolution it was twice occupied by the British, and a number of engagements were fought here. Because of its being an important railroad center, it was the scene of constant fighting during the last year of the Civil War in America (See PETERSBURG, SIEGE OF). Fourteen battles were fought in and around the city. The city is in an agricultural region in which tobacco is the chief product. There is good water power, and the manufactures include tobacco, cotton, silk, knit goods and other articles. The city has the Southern Female College, University School for young men, the Virginia Normal and Collegiate Institute for colored students and the State Central Hospital for colored insane. Other important structures are the Y. M. C. A. building, the Home for the Sick, the Benevolent Mechanics' Association building, with its library and museum, and the Masons', Odd Fellows' and Red Men's buildings. Population in 1900, 21,810.

Petersburg, SIEGE OF, a famous siege of the Confederate position at Petersburg, between June, 1864, and April, 1865. The Federal army was commanded by Grant, who, after his famous Virginia campaign, took up his position before Petersburg, with the intention of capturing this point and thus compelling Lee to evacuate Richmond. An assault made on the fifteenth of June by General Butler with a force largely outnumbering the defenders, failed through poor leadership, and other assaults on the three following days were equally unsuccessful and resulted in a loss of fully ten thousand men. On July 30 occurred the fiasco of the famous Petersburg Mine. The mine had been run under the Confederate fort for a distance of more than five hundred feet by General Rosecrans, who planned to lead a charge through the gap in the works which was to be made by the explosion. Inefficient leadership caused the Federals to be trapped in the crater and mowed down by the thousands by the steady Confederate artillery fire. Other assaults upon the works were made from time to time, but without effect, until April 2, 1865, when a continuous bombardment of more than a week compelled Lee to evacuate both Petersburg and Richmond.

Pe'terson, FREDERICK (1859–), an American physician who served as professor in a number of prominent universities, and who finally located in New York City, where he became the head of the department of nervous diseases in the College of Physicians and Surgeons. Besides publishing a book, *Mental Diseases*, he served for many years as one of the principal editors on several of the leading medical journals.

Peter the Hermit or **Peter of Amiens** (about 1050-1115), an enthusiastic monk of Amiens, whose preaching, after a pilgrimage to the Holy Land, gave rise to the First Crusade. Peter led the way through Hungary at the head of an undisciplined multitude of more than 30,000 men, a comparatively small number of whom survived to reach their destination. He distinguished himself by his personal courage at the storming of Jerusalem. On his return to his native country he founded the abbey of Noirmoutier.

Petition, *pe tish' un*, an appeal made to one who has power to grant it. The first amendment to the Constitution of the United States provides that Congress shall make no law "abridging the right of the people peaceably to assemble, and to petition the government for a redress of grievances." The right of petition has always been treated as a natural right, whereby the citizen can make his grievances known to the highest authority in the government.

Petition of Right. When Charles I assembled Parliament in 1628, one of the first actions of the House of Commons was to draw up a statute detailing the grievances which they felt they had against the king, and this statute, from the form in which it was presented, was known as the Petition of Right. It made no pretense of being a new law, but simply rehearsed the old statutes which Charles had violated and begged that the ancient rights might be confirmed. Besides the most important provision, that freemen should not be arrested without due legal process, it cited those statutes which forbade the levying of taxes or loans without the consent of Parliament, the quartering of soldiers upon private citizens and the proclamation of martial law in time of peace. Charles attempted to return an equivocal answer to this document, but was obliged to assent to it when Parliament began proceedings against the duke of Buckingham.

Petos'key, Mich., a city in Emmet co., 43 mi. s. w. of Cheybogan, on Little Traverse Bay, which is an arm of Lake Michigan, and on the Grand Rapids & Indiana and the Pere Marquette railroads. It has steamer connection on the Great Lakes and is an attractive summer resort. The city contains a public library, a normal school, the Lockwood Hospital and nine churches. The industrial establishments are lumber mills, leather factories, paper mills, machine shops and other factories. It was settled in 1874 by traders and missionaries and was incorporated as a city in 1896. Population in 1904, 5186.

Petrarch, *pe'trahrk*, Francesco (1304-1374), an Italian poet and scholar, born at Arezzo. It was at Avignon in 1327 that he first saw, in the Church of Saint Claire, the Laura who exercised so great an influence on his life. After this first meeting Petrarch remained at Avignon three years, singing his purely Platonic love and haunting Laura at church and in her walks. He then spent several years in traveling, visiting the chief cities of France, Italy and Germany, and on his return he bought a small estate at Vaucluse, near Avignon, that he might be near Laura. At intervals during the rest of his life, he traveled again through Italy, and many honors were shown him. In 1341 he was called to Rome to receive the laureate crown awarded for his Latin poem of *Africa*, an epic on the Punic wars. At Parma he learned of the death of Laura, which he celebrated in his *Triumphs*. A large part of his time was employed in various diplomatic missions until 1370, when he took up his residence at Arqua, near Padua, where he passed his remaining years in scholarly pursuits. Although Petrarch based his hopes of fame upon his scholarly Latin works, these are practically forgotten now, while his Italian verse, of which he thought comparatively little, has made him famous for all time.

Pet'rel, an oceanic bird, about the size of a large duck. It resembles the gulls, but usually lives farther out at sea and is found in prodigious numbers breeding in the Arctic and Antarctic regions. Petrels are strong on the wing and sail about with very little visible motion. Often they

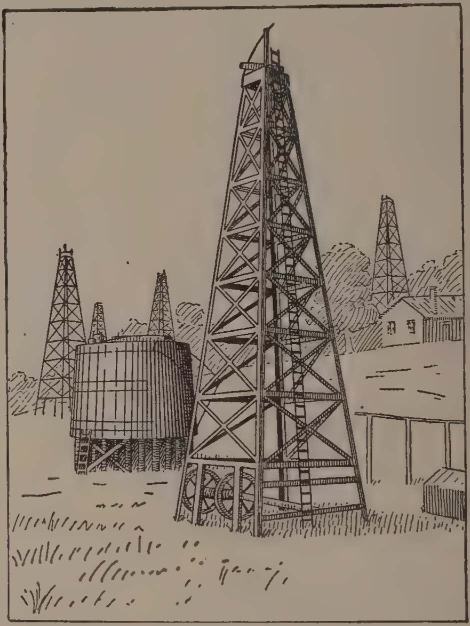
MOTHER CAREY'S CHICKENS

are seen to run rapidly along the surface of the water, and it is their habit to follow ships sometimes many days from shore, in order to get the refuse which is cast overboard. *Mother Carey's chickens*, or the *stormy petrels*, are common birds that are thought by the sailors to foretell the approach of a storm, and in consequence sailors never injure them. The *fulmar* is a petrel common on the North Atlantic coast, valuable for its feathers and down and for an oil found in its stomach.

Pe'trie William Matthew Flinders (1853-), a British Egyptologist, born in Woolwich, England. From 1870 to 1875 he devoted his time to research in meteorology, and the next few years, to mapping and measuring ancient British earthworks. In 1880 he became interested in investigations of the pyramids of Gizeh, Egypt, where he spent a great deal of his time, having been given charge of the excavations in the Delta carried on by the Egypt Exploration Fund. The results of his work in Egypt are found in the *Memoirs* of the Egypt Exploration Fund. The reports which he has published are highly valued by Egyptologists, and the discoveries and investigations which he has made have added a great deal to knowledge of the ancient Egyptians. Among the works which he has written are *Stonehenge: Plans, Descriptions and Theories*; *The Pyramids and Temples of Gizeh*; *Tanis*; *Naukratis*; *The History of Egypt*; *Egyptian Tales*, and *Royal Tombs of the First Dynasty*.

Petro'leum (rock oil), a mineral oil, occurring in rock or sand in various countries. It is a variety of bitumen. In the United States it occurs in large quantities in Pennsylvania, in the southern part of Ohio, in certain sections of West Virginia, in the region around Beaumont, Tex., in the southern part of California, in Colorado and in Kansas. Recent valuable oil fields have also been discovered in Alaska. Petroleum is also found in Canada, around the Caspian Sea, in Russia and in Burmah. In these places it sometimes flows from the earth and accumulates on the surface of pools of water or streams. In other places it exudes slowly from seams in the rock and hardens on coming in contact with the sun and air; but the petroleum of commerce is obtained by boring wells into the layer of sand or rock which contains it. In some instances the oil is confined under great pressure, and when the reservoir is struck the well flows in a steady stream, often producing a fountain which extends several feet into the air. When the pressure is low, the oil has to be pumped from the well. For the structure of these wells, see Well Boring.

As it comes from the wells, petroleum is a dark-colored, oily liquid, varying in shades from brown to black, and in thickness from the consistency of kerosene to that of warm tar. In this condition it is known as *crude petroleum*. Crude petroleum is extensively used in Texas, New Mexico, Arizona and the southern part of California for fuel, also in some places for improving roads by the process known as *oiling*. When a thin coating of oil is spread over a road made of fine sand and soil, it gradually sinks into the surface and cements it together, hardening on becoming dry and making a surface that will wear for years.



OIL WELLS AND TANKS

Before petroleum can be used for other purposes, however, it needs to be refined, or distilled. This is done by placing the oil in huge tanks, each containing 1200 barrels or more. These are heated by steam. The different products are thus separated by distillation. The most volatile, such as naphtha and benzine, are driven off at a low temperature. After these have been expelled, the temperature is raised, and kerosene, the most valuable of all products, is obtained. After the separation of the volatile products, the fuel oils, paraffin oils and paraffin still remain. By further distillation of these, lubricating oil, coke, coal tar, paraffin and pitch are obtained. Each of these is described under its title.

By far the most important use of petroleum is for illuminating purposes, in the form of kerosene. The oil and its refined products are transported in various ways. For the transportation of crude oil, pipe lines lead from the oil regions to the large refineries, the oil being pumped as far as from the Pennsylvania fields to Chicago. For the distribution of petroleum, tank steamers are constructed for water transportation, and tank cars, for transportation by railways. These cars are familiar sights on all lines of railway, and the oil company usually establishes in every large town a depository, which consists of several metallic tanks, to contain the oil of different grades. As the cars arrive they are emptied into these tanks, from which the oil is distributed to the local dealers.

Russia and the United States are the leading countries in the production of petroleum, and their output constitutes over nine-tenths of all that produced in the world. The production in the United States amounts to about 165,000,000 barrels a year. While Russia produces the largest quantity of crude petroleum, the United States leads in the production of the manufactured products.

The petroleum industry in the United States dates from 1859, when Col. E. L. Drake of Titusville, Pa., sank a well that produced 25 barrels a day. Colonel Drake's purpose in sinking the well was to obtain a supply of oil which he could put upon the market under the name of *Seneca oil,* as a remedy for rheumatism. Other wells immediately followed Drake's, and within two years the industry was firmly established in and about Oil City and Titusville. From that time the petroleum industry has continued to grow, until it has reached its present proportions.

Pet'tus, EDMUND WINSTON (1821–), an American lawyer and politician, born in Limestone County, Ala. He received an elementary education, was admitted to the bar in 1842 and began practice at Gainesville. He served as lieutenant in the Mexican War and went as a gold seeker to California in 1849, but returned to Alabama six years later and resumed the practice of law. He served in the Confederate army, becoming a brigadier general. After the war, though taking an active part in Democratic politics, he accepted no political office until 1897, when he was elected United States senator. He was reëlected in 1903. In 1906 he was the oldest member of the United States Senate.

Petu'nia, a genus of plants, belonging to the same family as the potato and tobacco. Petunias are much prized by gardeners for the beauty of their flowers. There are a great number of varieties, with large flowers, varying from white to violet, rose, pink and many other colors. The genus is a native of South America.

Pe'wee. See PHOEBE.

Pew'ter, an alloy of tin and lead, or of tin with proportions of lead, zinc, bismuth, antimony or copper, used for domestic utensils. One of the finest sorts of pewter is composed of 100 parts of tin to 17 parts of antimony, while the common pewter, of which beer mugs and other vessels are made, consists of 4 parts of tin and 1 of lead. The kind of pewter of which teapots are made is an alloy of tin, brass, antimony and bismuth; it is often known as *Britannia ware.*

Phaedra, *fe'dra,* in Greek mythology, daughter of Minos, king of Crete, and sister of Ariadne. She was sought in marriage by Theseus and was brought to Athens. There, however, she fell in love, not with Theseus, but with his son Hippolytus. As he refused to comply with her request and elope with her, she accused him to his father of having tried to kidnap her, and in response to the prayers of Theseus, Hippolytus was killed by Neptune. When his drowned body was thrown at the feet of Phaedra, she became repentant, confessed her sin and killed herself.

Phaethon, *fa'e thon,* in classical mythology, the son of Apollo and Clymene. Having boasted to his companions that the sun god was his father, he was mocked by them, and when he reported this to his mother, she advised him to visit Apollo and ask his recognition. Apollo gladly acknowledged Phaëthon as his son, and in response to a request, he promised to prove their relationship by granting to Phaëthon anything he might ask. When, however, the boy begged to be allowed to drive the chariot of the sun for one day, Apollo repented of his promise and tried to persuade the boy of his folly. Phaëthon was determined, however, and at last Apollo reluctantly entrusted him with his fiery steeds, giving him strict directions as to how to drive. The horses, however, immediately recognized that their master did not have hold of the reins, and they dashed wildly out of their course, coming at some times so near to the earth that they almost set it on fire, and turned black the races living in Africa; at other times they rose so far above the earth that everything was frozen. Jupiter, seeing this destruction and fearing for what else might happen, struck Phaëthon with a thunderbolt and threw him into the river Po.

Phaeton, *fa′e ton,* the name given to a light pleasure carriage, with a low body and low wheels. The name is used very loosely and is applied to pleasure carriages of a number of widely different patterns.

Phalanx, *fa′lanks* or *fal′anks,* a name given generally by the Greeks to the whole of the heavy armed infantry of an army, but more specifically to each of the grand divisions of that class of troops, when formed in ranks and files close and deep, with their shields joined and their pikes crossing each other. The Spartan phalanx was commonly 8 files deep, while the Theban phalanx was much deeper.

Phanerogamous, *fan ur og′a mus,* **Plants** or **Phanerogams,** *fan′ur o gamz,* the general name for a great division of flowering plants, also called *phaenogams,* in distinction from *cryptogams.* As these names have perpetuated a misconception as to their manner of growth, the more modern name of *spermatophytes* is now in more general use. The chief distinction between the two great classes of plants is that the spermatophytes produce seeds containing an embryo, while the cryptogams produce spores which are simple cells without an embryo. To the phanerogams belong nearly all of those plants which are conspicuous and most of those which are useful to man. It is known that more than 100,000 species of phanerogams have been described.

Pharaoh, *fa′ro* or *fa′ra o,* the name given in the Bible to the kings of Egypt, corresponding to the P-RA or PH-RA of the Egyptian hieroglyphics, which signifies *the sun.* The identification of the Pharaohs mentioned in Scripture with the respective Egyptian kings, particularly the earlier ones, is a matter of great difficulty. See EGYPT.

Pharisees, *far′i seez,* a religious sect which had risen into great influence among the Jews at the time of Christ and which played a prominent part in the events recorded in the New Testament. The most probable account of the origin of the Pharisees as a distinct sect is that which refers it to the reaction against the attempt of Antiochus Epiphanes to break down the distinctions between his Jewish and his Greek subjects. At the time of Christ the Pharisees stood as the national party in politics and religion, the opponents of the Sadducees. The fundamental principle of the Pharisees was that of the existence of an oral law to complete and explain the written law. "Moses," says *Mishna,* "received the law (the unwritten law is meant) from Sinai and delivered it to Joshua, and Joshua to the elders, and the elders to the prophets, and the prophets to the men of the Great Synagogue." This oral law declared the continuance of life after the death of the body and the resurrection of the dead. In process of time, additions, which were not pretended to be derived directly from Moses, were made, namely, (1) decisions of the Great Synagogue by a majority of votes on disputed points; (2) decrees made by prophets and wise men in different ages; (3) legal decisions of proper ecclesiastical authorities on disputed questions. These authorities comprehended both the writers of the sacred books and their approved commentators. There is no doubt that, though their strict observance of small points often led to hypocrisy and self-glorification, the sect contained a body of pious, learned and patriotic men of progress. Paul and his teacher Gamaliel were both Pharisees.

Pharmacist, *fahr′ma sist.* See APOTHECARY; PHARMACY; PHARMACOPOEIA.

Pharmacopoeia, *fahr′ma ko pe′ya,* a book compiled by a government or by national conventions, which contains such information as descriptions of medicines, tables of doses, formulas and standards of purity and strength. In the United States the medical colleges and societies appoint delegates, who meet in a national convention and prepare the United States Pharmacopoeia. These conventions have been held in Washington every ten years since 1820, the last edition of the Pharmacopoeia having been published in 1905. The laws of the states and of Congress enforce the authority of this book. Every pharmacist should know his Pharmacopoeia thoroughly, and physicians should be well acquainted with it.

Pharmacy or **Pharmaceutics,** *fahr′ma su′tiks,* the art of preparing, compounding and dispensing medicine. Physicians were the first pharmacists, for originally they prepared their own medicines, but as practice grew broader and drugs were more generally used, a separate profession, that of the pharmacist, naturally arose. The laws of almost every state now rigidly exact a technical education and drug store experience before licensing pharmacists to practice. Many schools, some of them connected with the most prominent universities in the United States, give, in courses extending over two or four years, the training necessary, though in most states the license to practice must be obtained directly from a specially appointed board of pharmacy. Pharmacists still use, in compounding their medicines, the old apothecaries' weight, whose pound, divided into ounces, drachms, scruples and grains, contains 5760 grains.

Pharos, *fah'ros,* a peninsula, formerly an island, on the western end of the Egyptian coast, now occupied by part of the modern city of Alexandria. It is chiefly famous as the site of the famous Pharos, or lighthouse, erected by Ptolemy I and Ptolemy Philadelphus. This lighthouse, which rested on a base 100 feet square, was several hundred feet high and stood for nearly sixteen hundred years, until destroyed in the fourteenth century by an earthquake. It was considered one of the seven wonders of the ancient world.

Pharynx, *far'inks,* the term applied to the muscular sac which lies between the cavity of the mouth and the narrow esophagus, with which it is continuous. It is of a funnel shape, is about 4½ inches in length and communicates with the two nostrils, the two Eustachian tubes, the mouth, the larynx and the esophagus. It aids in swallowing and in producing the higher notes of the voice.

Pheasant, *fez'ant,* the general name given to that class of birds of which the common barnyard fowl, the cock and the hen, are the best representatives. Most species are handsome, the males being distinguished by bright plumage, long tails and conspicuous crests. They are not natives of the United States. The *common pheasant* is a native of Asia, but was introduced into Europe and has been partially domesticated in the United States under the name of English pheasant. Including the tail, which is about eighteen inches long, the bird has a length of three feet. The male is reddish-brown above, with blue, green and gold reflections on the head, bare cheeks, and purplish-brown sides and lower parts. The tail has black cross bands. The female is smaller and of more sober coloring.

SILVER PHEASANT

The *golden pheasant,* found in China, is characterized by its bright and varied plumage. It is golden yellow and scarlet above, its crest is light yellow, its back, green, its wings, blue, and its long and graceful tail, handsomely variegated. The *silver pheasant* of China is pure white, streaked with black, except for its throat, underparts and large crest, all of which are shining black. There is a bright red velvety space about its ears, and its feet and legs are purple. Numerous other species are prized for their beauty, and some of them have been domesticated. The *peacock pheasants,* common from India to China and on the Malayan islands, include many species, among which the *Tibetan peacock* is well known.

TIBETAN PEACOCK

Phelps, *felps,* Elizabeth Stuart. See Ward, Elizabeth Stuart Phelps.

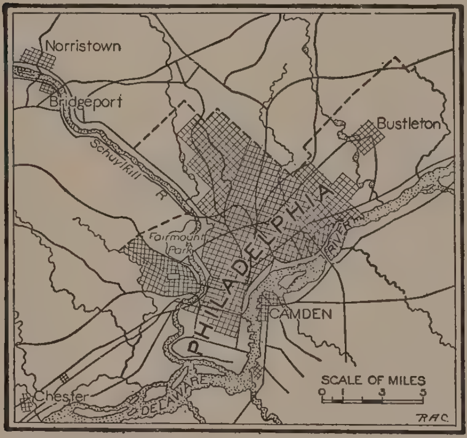
Phenacetine, *fe nas'e tin,* a coal tar product, given by physicians as a medicine to relieve pain. It is similar in its effects to antipyrine, but is considered less dangerous.

Phenic, *fe'nik,* **Acid** or **Phenol.** See Carbolic Acid.

Phi Beta Kappa, *fi' ba'ta kap'pa,* the earliest of the Greek letter societies, founded in December, 1776, at William and Mary College, in Virginia. The letters are the initials of the Greek words meaning "Philosophy, the guide of life," adopted as the motto of the society. The badge chosen was a gold watch key. Gradually the society lost its secret character and became a purely honorary organization, and as such it exists in most of the larger colleges of the United States.

Phidias, *fid'i as,* the greatest of Greek sculptors, was born about 490 B. C., in Attica, and flourished in the Age of Pericles, but of his life few particulars are known. His name is always associated with the buildings which crown the Acropolis at Athens; for in the Parthenon was his colossal statue of Athena, made in ivory and gold, representing the goddess standing with a spear in one hand and an image of Victory in the other. The statue, with the pedestal, was about 41½ feet in height. His colossal statue of Zeus, at Olympia, was ranked for its beauty among the wonders of the world. Zeus was here seen sitting upon a throne, with an olive wreath of gold about his temples. The upper part of his body was naked, and a wide mantle covered the rest of it, hanging down in the richest folds to his feet, which rested on a stool. The nude parts of the statue were of ivory, the dress was of beaten gold. The right hand held a Victory, and the left held a scepter tipped with the eagle. The Zeus was removed to Constantinople by Theodosius I and was destroyed by fire in 475 A. D. Phidias was accused of impiety, perjury, embezzlement and various other crimes, and it is thought that he finally died from poison. None of all the works which made his name famous now remains.

Philadelphia, *fil'a del'fe a,* Pa., the county-seat of Philadelphia co., chief city of the state and third city of the United States, situated on the Delaware River, at its confluence with the Schuylkill, about 100 mi. from the ocean, 90 mi. s. of New York, 136 mi. n. of Washington and 822 mi. s. e. of Chicago. It is on the Pennsylvania, the Philadelphia & Reading, the Baltimore & Ohio, the Lehigh Valley and other railroads.



The city extends for 22 miles along the Delaware, and in breadth from east to west it varies from 6 to 10 miles, its area being about 130 square miles. The older part of the town occupies the ground between the Delaware and Schuylkill rivers and contains the business center and most of the leading industries. The city is laid out in accordance with a plan devised for the site it was to occupy, and it is one of the best-arranged cities in the world. The streets run north and south and east and west. Those parallel with the Delaware are numbered and begin with the one nearest the river. Those extending east and west are named. Market Street, the chief business thoroughfare running east and west, divides the city into north and south sides, and Broad Street, the chief north and south thoroughfare, divides the portion between the rivers into east and west sides. That part of the city beyond the Schuylkill is known as West Philadelphia. The buildings are numbered in accordance with the streets, each block beginning with a new hundred, so that from the number and the letters indicating north and south, east and west, one can tell at once the location of any building. In the older part of the city the streets are quite narrow, so that in a few of them street cars can run in only one direction; but the residential sections and the newer parts of the city have wider streets. Most of the streets are paved with brick, stone or asphalt, or are macadamized.

Philadelphia is frequently known as the *Quaker City*, the *City of Brotherly Love* and as the *City of Homes*. The last term is especially appropriate, for in no other city in America are found so many small houses owned by their occupants. All of the older buildings and many of those of later construction are of red brick, and the houses have wide marble steps and trimmings. This style of architecture gives Philadelphia an individuality seen in no other city in the United States. In some sections of the city the continuation of the same style of houses for many blocks gives the streets a monotonous appearance.

Parks. The park system began with the original plan of the city in the establishment of numerous small parks, known as *squares*. These are distributed throughout the more densely populated sections, and many of them are noteworthy for their trees, shrubbery and statuary. On the south side of the city is League Island Park, adjoining the navy yard, which is on an island of the same name. To the east of this is Point Breeze Park, and some blocks north of this is Girard Park, which occupies about four squares. In the heart of the city are found Jefferson Square, Rittenhouse Square, which is in the center of the best residential section; Washington Square, Independence Square, Franklin

Square, and Logan Square; but by far the most important of the city's pleasure grounds is Fairmount Park, containing nearly 3000 acres. This is located on the west side of the city and is divided by the Schuylkill into East Park and West Park. Another portion, extending along the Wissahickon, is known as the Wissahickon Valley. This is a deep ravine which has been preserved almost in its natural state. Fairmount Park contains many objects of historic interest. Among these is the cottage of William Penn, the first brick building erected in Philadelphia, which has been transferred from its original site, on Letitia Street, near the river. On Lemon Hill is the house in which Robert Morris lived during the Revolutionary War. At the Green Street entrance of the park is the Washington Monument, which was erected by the Society of Cincinnati at a cost of $250,000. There are also a number of statues of noted men, including those of Goethe, Schiller, Columbus, Lincoln, Grant, Meade and Garfield. This park contains many miles of drives and boulevards and over ten miles of bridle paths. In the southern portion of the West Park was located the Centennial Exposition, held in 1876. Two of the original buildings, Horticultural Hall and Memorial Hall, still remain. The former contains a fine collection of tropical plants, and the latter is used as an art gallery and museum. Adjoining this part of the park on the south is the zoölogical garden, which contains one of the finest collections of animals in America.

Buildings. Philadelphia contains a number of buildings of historic interest, and these have been carefully preserved. Carpenter's Hall, on Chestnut Street, between Third and Fourth, is a plain two-story brick structure, in which the First Continental Congress met in 1774. Independence Hall, on Chestnut, between Fifth and Sixth streets, is the structure around which cluster the most interesting associations. This is the building in which the Declaration of Independence was passed; it was occupied by the Continental Congress during most of the time of its existence, and in it the Constitution of the United States was framed. It contains many of the articles of furniture used by the old Congress and by the Constitutional Convention, as well as the old Liberty Bell which was rung at the passage of the Declaration of Independence (See Independence Hall). The Betsy Ross house, on Arch Street above Fourth, is the house in which the first American flag was made. The old London Coffee House, which in Revolutionary times was frequented by the leading men of the city and nation, stands on the corner of Front and Market streets. The Girard National Bank was originally built for the first United States Bank, and Christ's Church, on Second and Market Streets, begun in 1695, is one of the oldest buildings in the city.

First among the modern buildings, in importance and interest, is the city hall, usually known by Philadelphians as the "public building." This structure occupies nearly all of the square at the intersection of Market and Broad streets. It is 486 feet by 470 feet, is constructed of marble, has a height of 90 feet, with corner pavilions rising to 161 feet, central pavilions to 203 feet, and a tower surmounted by a colossal statue of Penn 37 feet high, the top of which is 548 feet from the ground. This building is occupied by the county and city offices and has cost, including erection and furnishings, nearly $25,000,000. The tower contains a clock with dials 30 feet in diameter. Next in importance are the Federal buildings, including the new United States mint, on Spring Garden Street; the postoffice, which occupies the site of the first president's mansion, on Market and Chestnut, between Ninth and Tenth; the customhouse, near the river, and the arsenal, on the south side of the city, near the Schuylkill. Other buildings worthy of note, because of their architecture, are the Masonic Temple, the Odd Fellows' Hall, the Young Men's Christian Association building, the Arcade building, the Betz building, the Commonwealth Trust building, the Drexel building and the terminal stations of the Pennsylvania and the Reading railroads. The Bourse building is the home of the Board of trade, and contains a large commercial museum. Among the churches, the most important are the Roman Catholic Cathedral, the largest church in the city; the Arch Street Methodist Episcopal, the Holy Trinity, the Friends' Meeting House, on Arch Street, and the First Presbyterian.

Institutions. Chief among the educational institutions is the University of Pennsylvania, occupying a beautiful site west of the Schuylkill and south of Market Street (See Pennsylvania, University of). Next in importance is Girard College, in the northern part of the city. This is one of the most heavily endowed educational institutions in America (See Girard College). The Drexel Institute has attained a wide reputation as an industrial school (See Drexel Institute). Besides these there are many other colleges and secondary schools maintained by different religious organizations. Among the public school buildings, the boys' high school and the girls' high school are worthy of note. In the line of scientific education should be mentioned the Academy of Natural Sciences and the Franklin Institute. Philadelphia is well supplied with libraries. That of the Library Company, which is the public library, has over 250,000 volumes, and maintains, besides the central library, 14 branches in different parts of the city. The University of Pennsylvania, Girard College, Drexel Institute and other institutes also have large libraries. Among the institutions of charitable nature are the hospitals for the insane, the general and the municipal hospitals and the Pennsylvania Hospital, founded in 1751, at the instigation of Benjamin Franklin. In addition to these are numerous charitable institutions maintained by the different religious denominations of the city.

Commerce and Industry. Philadelphia is one of the great industrial centers of the country, being exceeded only by New York and Chicago in this respect. It is the first city in the Union in the manufacture of chemicals, woolens and hosiery; the second in bookbinding and the manufacture of blank books and of tobacco and cigars; the third in the manufacture of iron and steel, hats and caps, and in the printing of newspapers and periodicals and the manufacture of clothing. It is especially noted for its manufacture of carpets. Among its great industrial establishments are found the Baldwin Locomotive Works, the largest works of the kind in the world, and the Cramp shipyards, in which are built some of the largest and best ships made in the United States. The Delaware admits the largest ocean steamers, and Philadelphia has an extensive foreign commerce. The docks are located along the river front, and here most of the wholesale trade is conducted. The city is also an important receiving and distributing center for those portions of the country reached by the divisions of the Pennsylvania, the Baltimore & Ohio and the Philadelphia & Reading railroads.

History. The first settlement was made in 1636 by Swedes and was named Wicaco. The first English settlement was made in 1681 under Captain William Markham, who came to the country as deputy governor under William Penn. The colony grew rapidly, and within four years it had over 2500 inhabitants, most of whom were Quakers. A few Germans also settled in Germantown, now within the city limits, and the influence of these two classes affected the life of the city for many years. The city was chartered in 1701. During the Revolutionary period Philadelphia was the center of political activity and the capital of the colonies. It was occupied by the British for nearly a year, from September, 1777, to June, 1778. After the close of the war it was the national capital until 1800, and from 1755 until near the middle of the nineteenth century it was the chief city in wealth, commerce and culture in the country. With the completion of the Erie Canal, in 1825, New York received advantages that attracted to her harbors much of the commerce that formerly came to Philadelphia. Consult Repplier's *Philadelphia: the Place and the People*, and Rhodes's *The Story of Philadelphia.*

Philae, *fi'le*, a small island in the Nile, on the borders of Nubia and Egypt, just above the first cataract and about 5 mi. s. of Assuan. It contains some remarkable ruins, among which are obelisks, temples and monuments. The most ancient of the temples was erected by Nectanebo II, about four centuries B. C. There is a great temple to Isis, to whom the island was especially sacred. The great dam, which has been built a short distance below Philae, threatens the existence of the ruins.

Philemon. See Baucis and Philemon.

Philip, *fil'ip*, one of the twelve apostles, a native of Bethsaida, the city of Andrew and Peter; called to follow Jesus at Bethany. After the resurrection he was present at the election of Matthias to the apostleship, but he is not again mentioned. In the Western Church he is commemorated on May 1.

Philip, the Evangelist, often confounded with Philip, the apostle, is first mentioned in *Acts* VI, 5. He preached at Smyrna, where Simon Magus was one of his converts; he baptized the Ethiopian eunuch, and he entertained Paul and his companion on their way to Jerusalem. Philip had four daughters who had the gift of prophecy.

Philip II, Augustus (1165–1223), king of France, was crowned during the lifetime of his father, Louis VII, whom he succeeded in 1180. One of his first measures was the banishment of the Jews from the kingdom and the confiscation of their property. He joined Richard I of England on a crusade to the Holy Land, but soon quarreled with him, returned to France and invaded Normandy during Richard's captivity. After the accession of John to the English throne, Philip continued the struggle with England, confiscated the possessions of John in France and prepared to invade England at the instance of the pope. John allied himself with Germany and Flanders, but Philip gained a great victory at Bouvines.

Philip IV, called *the Fair* (1268–1314), king of France, succeeded his father, Philip III, in 1285. He had already married Joanna, queen of Navarre, and by this alliance he added Champagne, as well as Navarre, to the royal domain, which he made it his policy still further to increase at the expense of the great vassals. He was long engaged in war with Flanders, which resulted in the accession of the Walloon territory to France and the restoration of the rest of Flanders to its count, on condition of feudal homage. One of the chief events of the reign was the struggle with the pope, which resulted in the seizing and imprisonment of the pope, the appointment to that office of an adherent of Philip and the removal of the papal residence to Avignon. Philip left numerous ordinances for the administration of the kingdom, which mark the decline of feudalism and the growth of the royal power. He also convoked and consulted the States-General for the first time.

Philip VI (1293–1350), king of France, the first of the dynasty of Valois. He succeeded to the crown in 1328. In his reign occurred the wars with Edward III of England, who claimed the French crown as grandson of Philip IV. His reign was unfortunate for France, by reason of the inauguration of this long war, known as the Hundred Years' War; and Philip left an evil memory by his persecutions of Jews and heretics and by his confiscations and exactions.

Philip II (1527–1598), king of Spain, the son of Charles V and Isabella of Portugal. He was married first to Maria of Portugal, and on her death, to Mary of England. In 1555 his father resolved to abdicate the sovereignty of the Netherlands in Philip's favor; and in 1556 Philip received the crown of Spain, with its possessions in Asia, Africa and America. His first act was to propose a truce with France, which was broken almost as soon as concluded. In 1556 he went to England, where he was refused the ceremony of a coronation as well as the troops that he demanded in aid of his war with France. These, however, were at length conceded to him by Mary. By the Treaty of Câteau-Cambrésis in 1559, the French war was concluded in a manner favorable to Spain, but from this time Philip's fortunes began to decline. In 1566 began the revolt of the Netherlands, which ended in the separation of the seven northern provinces from the crown of Spain and their formation into the Dutch Republic. This struggle lasted about thirty years, till the close of Philip's reign. In 1580 the Spanish troops under Alva subdued Portugal, of which, with all its dependencies, Philip now became sovereign. The year 1588 saw the destruction of the Armada and the descent of Spain from her position as a first-class power in Europe. The remainder of Philip's reign was occupied with war and intrigues with France, but in 1598 the Peace of Vervins was concluded. Philip showed some disposition at the same time to make peace with England and the Netherlands, but his offers were not accepted.

Philip V (1683–1746), king of Spain, the first Spanish king of the Bourbon dynasty. He succeeded to the crown of Spain by the will of Charles II, who died without direct heirs. On the death of Charles, in 1700, he was immediately proclaimed king and was generally recognized in Spain, Naples and the Netherlands; but the succession was contested by the archduke Charles of Austria, whose claim was enforced by the armies of England, Holland and Austria in the wars of the Spanish Succession, which began in 1702. By the Treaty of Utrecht (1713) Philip was recognized as king of Spain, but Gibraltar was lost to Spain, Minorca was ceded to England, Sicily to Savoy and the Netherlands and Naples to Austria. Philip married Elizabeth Farnese in 1714, and Alberoni, the favorite of Elizabeth, became prime minister; by his ambitious plans he brought upon Spain war with the other European powers. In 1724 Philip resigned the crown in favor of his son Louis, but the death of Louis a few months later induced him to resume the royal power.

Philip II (382–336 B. C.), king of Macedon, son of Amyntas II and father of Alexander the Great. He succeeded his elder brother Perdiccas in 360. His position at first was not very secure, but as he had few scruples and was a man of the highest talents, both for war and diplomacy, in a short time he had firmly established himself, had reorganized the Macedonian army and had begun to extend his sway beyond his own kingdom. The terror of his name provoked the *Philippics* of Demosthenes, who endeavored to rouse the people of Athens to form a general league of the Greeks against him; but by 346 he was master of the Phocian cities and of the pass of Thermopylae, and as general to the Amphictyonic council he was the protector of the Grecian faith. In the execution of the duties of his office he marched into Greece to punish the Locrians for an act of profanity; but instead he seized the city of Elatea and began to fortify it. Demosthenes now exerted all his eloquence and statesmanship to rouse the ancient spirit of Grecian independence, and a powerful army was soon in the field, but as it was without able or patriotic commanders, it was defeated at the decisive Battle of Chaeronea, 338 B. C. After this last struggle for freedom Philip was acknowledged chief of the whole Hellenic world, and at a congress held at Corinth he was appointed commander of the Greek forces for the projected expedition against Persia. While preparing for this enterprise he was murdered.

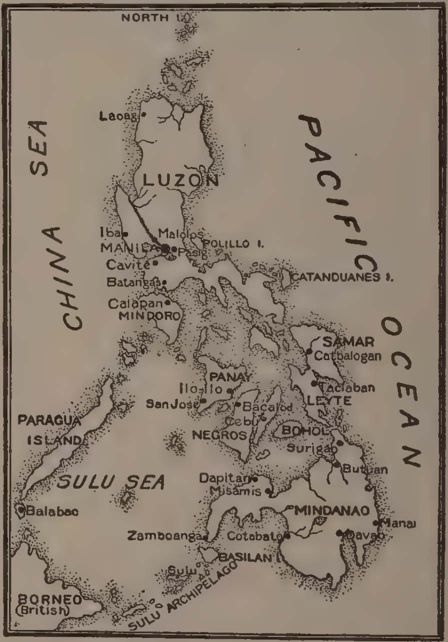
Philip, King. See King Philip.

Philippine, *fil'ip in,* **Islands,** a group of islands in the Pacific Ocean, occupying the Philippine Archipelago and situated between 4° 30′ and 21° 30′ north latitude, and 116° and 127° longitude east from Greenwich. The Philippine Archipelago, as bounded by the Treaty of Paris, has a length from north to south of about 1000 miles and a width from east to west of about 600 miles. The area is 115,000 square miles, or about the same as the combined areas of Nevada and Connecticut. Within this are grouped over 3100 islands, over 1600 of which are named. The rest are mere points of land and are designated by number or simply by location. No accurate survey of the archipelago has yet been completed. The ten largest islands, with their respective areas and populations, are given in the following table:

Island	Area in Square Miles	Population in 1903
Mindanao	45,559	499,634
Luzon	43,075	3,798,507
Samar	5,198	222,690
Negros	4,839	460,776
Panay	4,752	743,646
Palawan	4,368	10,918
Mindoro	4,050	28,361
Leyte	3,872	357,641
Cebu	1,668	592,247
Bohol	1,400	243,148

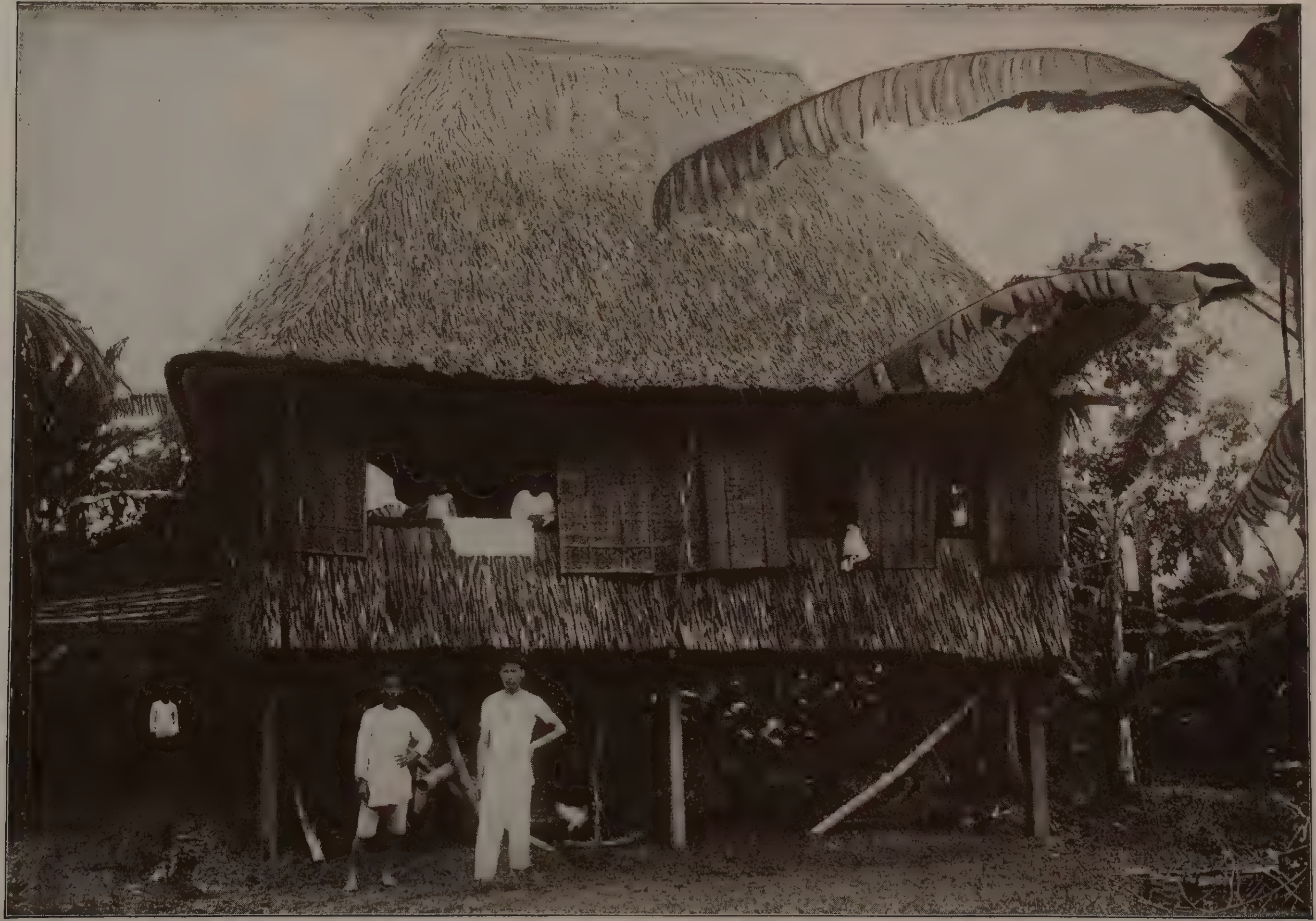
Of these, Luzon, though second in size, is by far the most important. This island has a length of about 425 miles and an extreme width of 140 miles. Mindanao measures about 300 miles in its greatest extent from east to west, and a little less from north to south.

Surface and Drainage. The Philippine Islands rest upon an oceanic plateau, which within the archipelago is seldom lower than 200 feet beneath the surface. The islands consist of uplifts on this plateau and are mostly of volcanic origin, though coral formations have added somewhat to the original area of the volcanic islands. The large islands are all mountainous. In the main the mountains extend in north and south directions and contain numerous volcanic peaks. About 50 of these are well marked, and of this number over 20 have been active within historic times; a few are now active or quiescent. The highest peak is Mount Apo, in Mindanao, 10,312 feet. In this island and Luzon there are a number of other peaks which exceed 7000 feet. Halcon, 8868 feet; Mayon, 8274 feet; Santo Tomas, 7418 feet, and Pagsan, 7330 feet, are all in Luzon; and Mount Canlaon, in Negros, is over 7000 feet high. In the valleys between the mountains and along the coasts of Luzon and Mindanao there are quite extensive tracts of low land, and some of the smaller islands, which are of coral formation, rise only a few feet above the sea. With scarcely an exception the islands are irregular in form, and this gives them a coast line which exceeds that of the United States.



PHILIPPINE ISLANDS

Luzon and Mindanao are the only islands that have rivers of any considerable importance. The chief rivers of Luzon are the Rio Grande de la Pampanga, flowing into Manila Bay; the Cagayan, draining the northern part of the island, and the Pasig, connecting Laguna de Bay with Manila Bay. Though short, this stream is of great commercial importance. The largest river in the islands is the Rio Grande de Mindanao,



A NATIVE HOUSE, MANILA

which drains the north and central parts of Mindanao and flows into Celebes Sea. The islands contain but few lakes of importance. Of these Laguna de Bay, near Manila, and Laguna de Bombon, also in Luzon, are the best known.

CLIMATE. Although the islands lie wholly within the tropics, their extent from north to south and their variation in altitude give them a great variety of climatic conditions. While they have a hot climate, the heat is not so intense as might be supposed from their latitude. The range of temperature is usually between 60° and 90° for different seasons of the year, the thermometer seldom falling below the former or rising above the latter point. The year is usually divided into three seasons. The first, extending from the middle of November to the middle of March, is the most agreeable. From the middle of March to the middle of July is the hot, dry season, and from the middle of July to the middle of November is the rainy season, in which the temperature is seldom higher than it is during the winter. That portion of the archipelago north of the tenth parallel of latitude is affected by the trade winds, which begin in April or May and blow for about five months. These are followed by the northeast monsoon, which continues the remainder of the year. The islands are also visited by frequent typhoons, which are the strongest at about the equinoxes. These pass over the islands from west to east and frequently do considerable damage (See TYPHOON). As in other tropical regions unaffected by large mountain ranges, the rainfall is heavy, but it is unevenly distributed throughout the year.

MINERAL RESOURCES. The variety and extent of mineral resources are not fully known. Coal similar to that mined in Japan is found quite generally distributed throughout the islands and is mined by the government for use on transports. Gold has been known to exist in Luzon for some centuries, and during all of this time placer mines have been worked by the natives, though the amount obtained has been small; from an American point of view, the gold mines do not seem to be of great value. There are also large deposits of copper and of iron ore in the central and northern parts of Luzon, and it is probable that a systematic survey of the other large islands will lead to the discovery of similar deposits. Petroleum has been found in the island of Panay.

VEGETATION. About 80,000 square miles of the islands are covered with forests, which contain many varieties of hard and soft woods common in this part of the world. Among these are found gutta-percha and various species of palms, such as cocoanut, nipa and calamus. The last two are extensively used for building and domestic purposes. This forest area is directly under the control of the bureau of forestry of the Philippine government, which, through authorized agents, prevents wasteful cutting of the trees and holds the land so that large areas cannot be obtained by companies seeking to gain a monopoly of the lumber industry. Bamboo, which is of very great value to the natives, is found throughout the islands, and abacá, or Manila "hemp," grows wild in some sections. There are many species of tropical plants, noticeable for their brilliant flowers or for various economic uses.

ANIMAL LIFE. The islands have over sixty species of mature mammals. Some species of wild cats and civets are found; there are also bats, the most interesting of which is the flying fox, or fruit bat. One species of monkey is found, also a flying lemur. There are rats, squirrels and other small rodents. A native buffalo, called the timarau, is found in the forests of Mindoro. The water buffalo, or carabao, has been domesticated and is the chief beast of burden, and wild hogs are found in all of the large islands. The islands contain several species of deer, some of which have been domesticated. The domestic animals common to Europe and the United States have been introduced. Among these are a small horse, swine and sheep. Some humped cattle are found in various localities, and the breeds of cattle common in Europe and the United States have been introduced. Of birds, there are nearly 700 species. More than half of these are peculiar to the Philippines. The cockatoo and numerous species noted for their plumage are found. The largest reptiles are the python and the crocodile. Lizards are numerous, and are found in almost endless variety. The inland and coast waters contain numerous species of fish valuable for food, and the pearl oyster exists along the coasts in such numbers as to make fishing for its shell a profitable industry.

INDUSTRIES. Agriculture is the most important industry of the islands, yet it is carried on in a very primitive manner, and only a small portion of the tillable land is under cultivation. The soil and climate are well adapted to growing nearly all crops of the tropical regions. At present the chief crops are rice, Manila "hemp," sugar cane, tobacco and cacao. Coffee was formerly raised, but the crop has become unprofitable, on account of destructive insects. Hemp is extensively cultivated in some quarters, but a portion of that exported grows wild. With the introduction of modern methods of agriculture this crop can be made one of great value.

There are but few manufactures in the islands. Chief among these is the manufacture of cigars and other tobacco products. The natives are very skilful in the manufacture of textiles, and from the finest of the hemp fiber they produce fabrics remarkable for their lightness and softness, but these are seldom sent to foreign countries. The heavier textiles are sometimes exported. All these are manufactured on hand looms, and in both spinning and weaving the most primitive implements are employed. The manufacture of mats, bags, rope, leather and sugar is of some importance. Some of the tribes also show skill in wood carving and in the manufacture of furniture, and others are proficient in the making of edged tools, some of which have their blades highly ornamented.

Transportation. Until 1905 there was but one railroad in the islands. This extended from Manila northward 120 miles to Dagupan. At present railroads are in operation from Manila to Cabanabuan and to Antipolo, while others are already projected under government direction. In general the roads are very poor, and but few of the streams are navigable, but the insular government uses a portion of its income each year in constructing highways. All of the larger islands have been connected by telegraph, and Manila is connected with the United States by the American Pacific Cable and with the leading ports of Asia and Europe by other cables. A good postal system, based on that of the United States, is also in operation. While the facilities for transportation and communication are still inadequate, they are being rapidly improved, and with their improvement will come an increase of commerce, which naturally follows the development of transportation facilities. At present the only means of transporting commodities from the interior of the islands is by native carts or by pack animals.

Commerce. The commerce of the islands has never been large, but has increased quite rapidly since the American occupation. Manila, the chief seaport, has been opened to admit the largest ocean steamers, by the dredging of the bay and the construction of a new dock. Cavite and Dagupan, on Luzon, are also of considerable commercial importance, while Cebu, on the island of Cebu, and Iloilo, on Panay, are the most important ports in the central islands. The exports are hemp, which far exceeds all other articles in value; sugar, tobacco, copra (the dried meat of the cocoanut), and a limited amount of manufactures. The imports consist largely of manufactured goods and foodstuffs. The chief trade is with Great Britain, the United States and Spain. The annual exports are over $37,000,000, and the imports are over $34,000,000. From the tariff on imports and from internal taxes, the revenue for support of the government is derived. The coin in general use is the *peso*, valued at 50 cents in United States money.

Inhabitants and Language. The native people consist of the Negrito tribes, generally considered aborigines, numbering between 20,000 and 30,000, and the Malay tribes, of which there are a large number. The Negritos are the eastern negroes. They have curly hair and nearly black skin and are short of stature. They dwell in the interior and are still in a state of savagery In addition to these are the Igorrotes, occupying the central provinces of northern Luzon, a Malay tribe who are still in an uncivilized or partially civilized state. In general the term *Filipino* includes the seven Christianized tribes, of which the Tagalogs, Visayans, Bicols and Pampangans are the most important. These tribes occupy nearly all of northern Luzon, the central islands and the northern part of Mindanao. Among them are found all grades of culture, from the barbarian to the college-educated man, but the larger portion of them are civilized. The Moros occupy a large part of Mindanao and the Jolo Archipelago. See Races of Men, *color plate, Mongolian Types*, Figs. 6 and 13.

There are nearly as many dialects in the islands as there are tribes, and no one dialect or language predominates, even in the island of Luzon; consequently, ever since Spanish occupation it has been necessary to use a foreign language as the official language of the islands. This was naturally Spanish until after the American occupation, but on Jan. 1, 1911, English will become the official language of the government and the courts. The Tagalog, or Tagal, and Visayan dialects are the most fully developed of the native tongues, and these have reached such a stage of completion as to lead to the development of a limited native literature.

The people generally live in villages or cities, and are retiring and simple in their habits. They have the lethargy common to native peoples of tropical climates; yet, when sufficient inducement is offered, they have proved willing and efficient workers. Little dress is needed to protect them from the elements, hence their attire is scanty. Their houses are constructed of bamboo; the floors are built about five feet from the ground, and the roofs are covered with nipa or some other form of thatch. Their culinary utensils and articles of furniture are of the simplest sort.

By far the larger part of the civilized Filipinos are followers of the Roman Catholic faith. The Moros, as the name indicates, are Mohammedans. The uncivilized tribes practice various religious rites of a heathen nature. There are, however, natives who are followers of the leading Protestant denominations, but these churches have as yet obtained only a slight hold in the islands.

GOVERNMENT. The executive government consists of a governor-general and vice-governor-general and six other commissioners, appointed by the president of the United States, with the advice and consent of the Senate. Three of the commissioners are natives. Certain of the commissioners are heads of departments of the government. This commission also exercises certain legislative functions. The legislative authority is vested in a native assembly, chosen by qualified voters and consisting of not less than 50 nor more than 100 members.

The islands are divided into provinces. The affairs of each province are in the hands of a governor, treasurer, superintendent of schools, district engineer, attorney and an elective official; the governor, treasurer and elective official form the provincial board. When these provincial governments were established, the governor was appointed by the commission. He is now elected by the provincial assembly, which is composed of the members of the town councils and organized municipalities. The elective official is also elected by the provincial assembly. The provinces are divided into pueblos, or townships, and these are governed as municipalities. It was in the erecting of these municipalities that the commission took the first step toward instituting local self-government. The president and vice-president of the municipal council are elected, though the privilege of voting is restricted to the male inhabitants who hold some municipal office, have property of the value of at least $250, pay taxes to the amount of $15 and can read, write and speak Spanish or English.

The courts have been reconstructed on the American plan, and consist of a supreme court, with one chief justice, who is a native Filipino, and six associate justices, and a series of courts of first instance, presided over by native justices, besides municipal courts and courts of the justices of the peace. The courts of first instance are courts of record and have original jurisdiction in cases considered too important to be tried in the municipal or justice courts.

EDUCATION. The system of education is under the management of a superintendent of education, and public schools on the American plan have been established in all of the large islands. Immediately after the establishment of civil government, a thousand teachers were imported from the United States. The larger number of these have given their attention to the work of supervision and to the preparation of Filipinos for the work of teaching. A normal school is maintained at Manila, and the provinces constitute districts for supervision. Marked progress in elementary instruction is being made. The natives have manifested an eager desire for education and, especially, for learning the English language. Such has been the demand that the appropriations and facilities for supplying it are inadequate, and large numbers of children are yet unable to secure school privileges. These conditions are being remedied as rapidly as possible. English is the language taught and used in the schools.

CITIES. The chief cities are Manila, the capital; Cavite, Dagupan, Iloilo and Cebu, each of which is described under its title.

HISTORY. Magellan discovered the islands in 1521 and lost his life battling with the natives. After several ineffectual attempts at settlement by the Spaniards, the first colony was established in 1565 on the island of Cebu. From this foothold the Spaniards proceeded to occupy one island after another, until they had obtained control of nearly the entire archipelago. The occupation was followed by the work of the religious orders, who established missions among the natives and used every effort to convert them to Christianity. During the seventeenth century the islands suffered somewhat from the war between the Dutch and the Spanish, and in 1662 they were raided by Chinese pirates. Following this, for a period of a century the islands were left without disturbance. Because the main object of the occupation was to Christianize the inhabitants, and also because of opposition of Spanish merchants, no attempt was made to exploit the islands or in any way to develop their commerce. In the Seven Years' War the islands were captured by the British, but they were retroceded to Spain by the Treaty of Paris, in 1763. They then remained under Spain's control until the outbreak of the Spanish-American War in 1898, when the Spanish fleet was destroyed by the American squadron under Commodore Dewey on May 1. On August 13 Manila was captured and the islands came under American occupation. By the Treaty of Paris, which closed this war, the Philippines were ceded to the United States, on the payment to Spain of $20,000,000.

Previous to the outbreak of the Spanish-American War, there had been an insurrection in the islands, under the leadership of Emilio Aguinaldo and others. While the insurrection had been quelled by the Spanish authorities, the captain-general decided that the best means of pacifying the malcontents was to pay the leaders a large sum, on agreement that they should leave the islands, never to return. About one-half of this amount, $200,000, was paid to Aguinaldo and some others, who departed for Hong Kong. However, when the war broke out, Aguinaldo returned to Manila, and a short time after he proclaimed the Filipino Republic.

Aguinaldo and his troops assisted the American army in the investment of Manila and contributed no small part towards the capture of the city. He claimed that he had obtained from Dewey and certain American consuls a promise that the United States would hold the Philippines until an independent government could be established, treating these islands in the same way that Cuba was treated. These officers, however, denied that any such promise had been made, and when the islands were ceded to the United States, Aguinaldo instituted a revolt against American authority. This brought on a war which, beginning in 1899, lasted for more than two years; it is generally known as the Filipino Insurrection. In January, 1899, President McKinley sent the first commission to the islands to learn the state of affairs and to try to pacify the leading Filipinos and secure their allegiance to the government.

Over a year later, when there was prospect of peace, the second Philippine Commission, with William H. Taft of Ohio at its head, was appointed. In July, 1901, this commission established civil government throughout the islands, with the exception of a few places where hostilities still continued, and Judge Taft, the head of the commission, became civil governor. He was succeeded in 1904 by General Luke E. Wright, and he, in turn, was succeeded in 1906 by Henry C. Ide, who was followed by General James F. Smith. See AGUINALDO, EMILIO; SPANISH-AMERICAN WAR.

Philippopolis, *fil ip op'o lis,* the largest city of eastern Rumania, situated on the Maritza River, 86 mi. n. w. of Adrianople, with which it is connected by railway. The city is built on modern plans and has manufactures of textiles. It is an important commercial center and carries on an extensive trade with the surrounding country. Population in 1901, 42,849.

Philip the Good (1396–1467), duke of Burgundy. His father, an ally of Henry V of England against the king of France, was killed at the instigation of the French king's son, and a desire for vengeance led Philip to form a closer alliance with the English king. When, after the accession of Charles VII to the French throne, the English made conquest after conquest, Philip received at their hands land and honors and became more powerful than the king of France. Later, he made peace with France. Burgundy under him attained the height of its prosperity and was reckoned as one of the most important European states.

Philistines, *fil lis'tinz,* the name of a Semitic people or race who inhabited the southern part of the lowlands of Palestine, from the coast near Joppa to the Egyptian desert south of Gaza. Their five chief cities formed a kind of confederacy under five lords, or chiefs. They are frequently mentioned in the Bible as the enemies of the Hebrews.

Phillips, WENDELL (1811–1884), an American orator and reformer, born at Boston, Mass., the son of the first mayor of the city. He graduated at Harvard in 1831, studied law there and was admitted to the bar in 1834. But before clients came, he had been drawn away from his profession to the work of pleading for the abolition of slavery. A speech in Faneuil Hall in 1837 against the murderers of Lovejoy at Alton, Ill., made him at once the principal orator of the anti-slavery party; and henceforth, until the president's proclamation of Jan. 1, 1863, he was a leader in the struggle, his lectures and addresses doing more for the cause than can be estimated. He also championed the cause of temperance, of women's rights, of the indians, of prison reform and of labor. In 1870 he was nominated for governor by the Prohibitionists and the labor party. He was long a conspicuous lyceum lecturer, his elegant, polished oratory and manner making him extremely popular. His addresses on *Toussaint l'Ouverture, The Lost Arts* and *The Scholar in a Republic* are notable examples of his power. (See illustration on next page.)

Phillipsburg, *fil'lips burg,* N. J., a town in Warren co., 60 mi. w. of Newark, on the Lehigh Valley, the Pennsylvania and several other railroads and on the Delaware River, opposite Easton, Pa. It has good water power and excellent transportation facilities and contains foundries, furnaces, railroad shops, horseshoe factories, sheet iron works, silk mills, large coal yards and other establishments. It was settled in 1749 and was incorporated in 1861. Population in 1905, 13,352.

WENDELL PHILLIPS

Philology, *fil ol'o jy,* or **Comparative Philology,** terms commonly used to mean the science of language, otherwise called *Linguistic Science,* or *Linguistics.* This science treats of language as a whole, of its nature and origin, and of the different languages of the world in their general features, attempting to classify and arrange them and to settle in what relationship each stands to the others. That every language has a life and growth is true in a sense, for languages are continually in a state of change.

A language is a system of vocal sounds, through which ideas are conveyed from person to person, in virtue of the fact that certain ideas are attached to, or belong to, certain sounds by a sort of general understanding existing among those who use the language. That there is any natural law by which one idea belongs to one vocal sound rather than to another can hardly be affirmed, in view of the fact that if we select any one idea, we shall find that each of the thousand languages of the world expresses this idea by a different sound or group of sounds. Indeed, ideas can be conveyed otherwise than by vocal sounds, as witness the elaborate sign language that has been developed in some communities and the finger language of the deaf and dumb.

As to the origin of language, nothing is really known. We suppose that the earliest men had no language, but having suitable organs for speech they devised a language among themselves as a means of intercommunication. We may conclude that the earliest attempts at speech were either in imitation of the different sounds heard in nature or that they were based on the inarticulate utterances or cries by which human beings naturally gave vent to different emotions. However language originally arose, it is very certain that whatever language we speak has to be acquired from others who have already learned to speak it, and that those others have similarly acquired it from their predecessors, and so on backward into the darkness of the remotest ages. Every language is thus at our birth a foreign language to all of us.

The science of philology is of modern origin, being hardly, if at all, older than the nineteenth century. Already most valuable results have been attained and a large number of languages have been studied and classified; yet much remains to be done, and much remains uncertain and must always remain so.

One great difficulty that the philologist has to grapple with is that only a very few tongues possess a literature dating from before the Christian era and that the greater number have no literature at all.

Philology has succeeded in showing that the English language is one of a group of closely allied languages, which are known by the general name of the Teutonic, or Germanic, tongues. The other languages of the group, some of which are more closely connected with English than the rest, are Dutch, German, Danish, Icelandic, or Old Norse, Swedish and Gothic; to these may be added, as of less importance and having more of the character of dialects, Norwegian, Frisian, Plattdeutsch, or Low German of northern Germany, and Flemish, which differs little from Dutch. The Teutonic tongues are often divided into three sections, based on closeness of relationship—the High German, of which the modern classical German is the representative; the Low German, including English, Dutch, Frisian, Plattdeutsch and Gothic, and the Scandinavian, including Danish, Swedish and Icelandic. Another division is into East Germanic, including Gothic and Scandinavian, and West Germanic, including the others.

The evidence that all these languages are closely akin is to be found in the great number of words that they possess in common, in the similarity of their structure, their inflections, their manner of compounding words—in short, in their family likeness. This likeness can be accounted for only by supposing that these languages are all descended from one common language, the primitive Teutonic, which must have been spoken at a remote period by the ancestors of the present Teutonic peoples, there being then only one Teutonic people as well as one Teutonic tongue. In their earliest form and when they began to be differentiated, these languages must have had the character of mere dialects, and it is only in so far as each has had a history and literature of its own that they have attained the rank of independent languages.

The rise of dialects is a well-known phenomenon, taking its origin in the perpetual change to which all languages are subject. A language that comes to be spoken over a considerable area and by a considerable number of persons—especially when not yet firmly fixed by writing and literature—is sure to develop dialects, and each of these may in course of time become unintelligible to the persons using the others, if the respective speakers have little intercourse with each other. In this way is the existence of the different Teutonic tongues to be accounted for. A similar instance of several languages arising from one language is seen in the case of Italian, French, Spanish and Portuguese, all of which are descended from the Latin. Of the common origin of these, we have, of course, direct and abundant evidence.

The Teutonic tongues, with the primitive or parent Teutonic, from which they are descended, have been proved to belong to a wider group or family of tongues, which has received the name of Aryan, Indo-European, or (especially in Germany) Indo-Germanic family. The chief members of this family are the Teutonic; Slavonic (Polish, Russian, Lithuanian); Celtic (Welsh, Irish, Gaelic); Italic, or Latin; Hellenic, or Greek; Indic, or Sanskrit; Iranic, or Persian, and Anatolic, or Armenian. Just as the Teutonic tongues are believed to be the offspring of one parent Teutonic tongue, so this parent Teutonic and the other members of the Aryan family are all believed to be descended from one primitive language, the Aryan, or Indo-European, parent speech. The people who spoke this primeval Aryan language, the ancestors (linguistically at least) of the Aryan races of Europe and Asia, are believed by many to have had their seat in central Asia, to the eastward of the southern extremity of the Caspian Sea. This, however, is very problematical, and some philologists see reason to think that Europe may have been the original home of the Aryans. This latter view is now perhaps the one most generally held.

How remote the period may have been when the ancestors of the Teutons, the Celts, the Slavs, the Greeks, the Romans, the Persians and the Hindus were living together and speaking a common language, is uncertain. Yet the general character of their language is approximately known, and philologists tell us with some confidence what consonant and what vowel sounds the Aryan parent speech must have possessed, what were the forms of its inflections, and what, at the least, must have been the extent of its vocabulary, judging from the words that can still be traced as forming a common possession of the sister tongues of the family.

The Aryan tongues, ancient and modern, are entitled to claim the first rank among the languages of the globe, as to richness, harmony and variety, and especially as embodying a series of literature to which no other family of tongues can show a parallel. Next in importance come the Semitic tongues—Hebrew, Chaldee, Syriac, Arabic and their related languages. These, like the Aryan tongues, form a well-marked family, one notable peculiarity of which is the possession of "triliteral" roots, or roots of which three consonants form the basis and give the general meaning, while inflection or modification of meaning is indicated by internal vowel-change. Thus the vowels play a subordinate part to the consonants and do not, as in the Aryan tongues, associate with them on equal terms.

Other important linguistic families are the Hamitic, which includes ancient Egyptian, Coptic, Berber and Ethiopian; the Turanian, or Scythian, which includes Turkish, Finnish and Mongolian, and the Southeastern Asiatic, which includes Chinese and Siamese. Other families of languages are the Malayo-Polynesian, of the Indian Archipelago and the Pacific; the Bântu, a great family of South Africa, and the American indian languages, which are characterized as polysynthetic from the way in which they crowd as many ideas as possible into one unwieldy expression. All these families form groups, so far as is known, separate from and independent of each other; and attempts to connect any two of them, as Aryan and Semitic, for instance, have met with little success. Formerly, etymologists had no hesitation in deriving English words from Hebrew roots, but this was in the days when there was no science of comparative philology. That all languages are descendants of one original tongue, as believed by many, linguistic science can neither affirm nor deny. We may add that community of language is not a proof of community of race, since it is well known that, as the result of war or otherwise, races have given up the language that once belonged to them and adopted some other.

Philomela, *fil' o me'la,* in Greek mythology, a daughter of Pandion, king of Athens, who, being violated and deprived of her tongue by Tereus, the husband of her sister Procne, made known her wrong to the latter by embroidering it in tapestry. In revenge, the sisters murdered Itys, the son of Procne by Tereus, and served him up to his father. They then fled, and Tereus pursued them, but they were changed by the gods into birds, Philomela into a nightingale, Procne into a swallow and Tereus into a hawk.

Philosopher's Stone. See ALCHEMY.

Philosophy, *fil os'o fy,* (from the Greek *philos,* friend, and *sophia,* wisdom). According to the present use of the term, philosophy is the science which deals with speculation upon the final reality of things and upon the validity of the general concepts and principles underlying all branches of scientific knowledge. The scope of philosophy has been somewhat narrowed by the growth of the natural sciences and by the development of psychology, ethics and logic as distinct branches (See PSYCHOLOGY; ETHICS; LOGIC).

A knowledge of the history of philosophy is essential to an understanding of the subject, but only a brief outline of such history is possible in a brief article. History considers philosophy to begin with the Milesian school, founded by Thales about 600 B. C. Thales and his followers adopted many of the notions of the orientals, added their own ideas to these and attempted to arrange the whole into a system. This school attempted to discover a world-substance, from which all forms of nature are derived. This substance Thales considered to be water. His immediate successor considered it to be an indestructible, imperceptible substance, and still another believed it to be air.

The period of ancient Greek philosophy extended to about 500 A. D., or during eleven hundred years. It was divided into three minor periods. The philosophers of the first of these periods gave their attention almost entirely to the discovery of the material and laws relating to the origin and formation of the universe. The second period was characterized by the teachings of Socrates and his followers, who directed man's attention upon himself and proceeded to formulate certain rules of conduct by which man should be governed. During this period the sophists and cynics arose (See SOPHISTS; CYNIC SCHOOL OF PHILOSOPHY). The third period is characterized by the systems of Plato and Aristotle, whose theories were more idealistic than those of their predecessors. Plato asserted that the one eternal reality consists in a unity of ideas in an all-embracing and entirely good Idea, or God. Aristotle, anticipating modern methods of investigation, treated philosophy as an inductive science and proceeded from known facts to general truths (See CONCEPT; INDUCTIVE METHOD). This period was also characterized by Cynicism, Stoicism and Epicureanism, each of which is explained under its proper title.

The Romans borrowed their philosophy from the Greeks, selecting such portions of each system as they thought best suited to their needs, and thus constructing an eclectic system. During the Middle Ages the Schoolmen tried to harmonize Aristotle's system of logic with the fundamental tenets of the Church (See SCHOLASTICISM). Descartes (1596–1650) was the first great modern philosopher. He rejected the doctrine of Scholasticism and made the existence of individual reason the starting point of his system. He also made a complete distinction between mind and matter, and recognized God as the absolutely perfect being. From these and other general truths he proceeded to individual facts (See DEDUCTIVE METHOD), and he was the greatest modern advocate of deductive philosophy. Bacon, the founder of the modern inductive method, lived at the same time as Descartes, and to these leaders modern philosophy owes its foundation. See BACON, FRANCIS; DESCARTES, RENÉ.

The systems formed by later philosophers are the modification of the systems established by these men or by the philosophers of ancient times. The growth of the scientific spirit since the seventeenth century has lent influence to the inductive method, and the development of mathematical science has emphasized the deductive.

During the eighteenth and the early part of the nineteenth centuries many attempts were made to harmonize the spiritual and material elements in the universe, but most of the theories were complicated, and they have been discarded. These theories are of no interest except to the student of philosophy. Since the middle of the nineteenth century philosophy has taken a more practical turn. Among the German philosophers Hegel, Herbart and Lotze have had the greatest following, both in their own country and in England and the United States. Of the English philosophers John Stuart Mill, the founder of the Utilitarian School (See UTILITARIANISM), Darwin and Herbert Spencer have been the most influential in shaping philosophical thought. Skepticism and sensationalism have to quite an extent characterized the French theories. The only school of note established in the United States was that of the Transcendentalists, in which Ralph W. Emerson was prominent (See TRANSCENDENTALISM). Among American philosophers of note are Jonathan Edwards, Franklin, Bowen, Ladd, William James, Dewey, Ross, William T. Harris and the leaders of the Transcendental school. In addition to the articles already referred to, see METAPHYSICS; PSYCHOLOGY.

Phlox, *floks,* a genus of herbs, natives for the most part of North America, though some of the species are to be met with in Asia. The flowers, which are favorites in gardens, are of a purple or violet color, more rarely white or red. The trailing kinds are excellent for rock work. Some of the well-known wild species are the bluish *sweet-william* of the Central and Southern states, the *creeping pink* of the South, the lilac-tinted variety of the East and Drummond's phlox, commonly cultivated in gardens.

Phocion, *fo'she on,* (about 402–317 B. C.), an Athenian general, one of the most virtuous characters of antiquity. During the war with Philip of Macedon, the Athenians sent Phocion with troops to Euboea, where he obtained a complete victory over the enemy. Some time later he was dispatched to assist the cities of the Hellespont against Philip, whom he compelled to retire. Despite this fact, however, he believed that it was for the good of Greece to submit to Philip, and when Alexander later demanded the surrender of Athens, Phocion advised the city to give in to his demands.

Phoebe, *fe'be,* or **Pewee,** a little olive-green bird of the tyrant flycatcher family, very common in America and named from its call. It builds its compact little nest under bridges, on the beams, very near the water. It is a well-constructed nest, lined with cotton or some soft substance. Two broods are raised in a season, and when summer is over the birds migrate to the South. See KINGBIRD; WOOD PEWEE; also, NEST, *color plate,* Fig. 6.

PHOEBE

Phoenicia, *fee nish'e ah.* GEOGRAPHY. Phoenicia is the name given by the Greeks to the little strip of broken coast between the Mediterranean Sea and the Lebanon Mountains. In the Old Testament this region is called Canaan, and the inhabitants, Sidonians. The land is barren and rocky, but the harbors are good. Of the once famous "Cedars of Lebanon," but few remain.

PEOPLE. The Phoenicians, who were a Semitic people, akin to the Israelites, were the first great colonizing and commercial people of antiquity. They were, moreover, ingenious, and were noted for their improved alphabet (See ALPHABET) and their knowledge of the art of writing, for their skill in mining, in building and in casting metals, and for their manufacture of glass, of cloth and of purple dyes. Like the people of most commercial cities, they were lovers of peace and fond of luxury. Their religion resembled that of the Assyrians, but was even more cruel and debasing. Their chief deities were Astarte, the moon-goddess or goddess of love, and Baal, the sun-god, to whom it was customary to sacrifice every first-born child. They were never united under one ruler, but each city was a sovereignty in itself. Their literature seems to have been very scanty, consisting chiefly of annals, and it has been almost entirely lost. Our knowledge of their language comes from inscriptions, coins and seals and from Greek translations.

In their art, they were not original in their conceptions, but were influenced by their neighbors, whom, however, they usually surpassed in execution. The most remarkable objects which have been preserved are the great bronze votive shields, from the cave of Zeus on Mount Ida, embossed with Egyptian sphinxes, Assyrian lions and figures of Marduk. More beautiful, in their way, are the silver dishes, found in Assyrian palaces, with their exquisite scenes from mythology, legend or daily life. The Phoenicians were also skilled workers in ivory, expert glass blowers and cunning fashioners of jewelry.

History. All the early records of the native historians are lost, but in the earliest notices that we have, dating from the fifteenth century B. C., Phoenicia was in a state of dependence on Egypt, and the towns of Sidon, Tyre, Beirut and Acre, which afterward rose to such eminence, were already in existence. About 1000 B. C. the Phoenicians planted a trading settlement at Cyprus. After Cyprus, the southern coast of Asia Minor, the islands of the Aegean Sea, the northern coast of Africa, southern Spain, Sicily and Sardinia were colonized by them. Not only did they carry on a brisk trade with these colonies, but they became the carriers of merchandise between all the markets of the world. Their vessels carried tin from England; gold, pearls and frankincense from Arabia; silver from Spain; slaves, ivory and panthers' skins from Africa; linen from Egypt; copper from Cyprus; purple from Tyre, and cunningly wrought silver and brazen vessels from Sidon.

The principal cities of Phoenicia were Tyre and Sidon, and the most important of her settlements was Carthage. Satisfied with their freedom on the sea and their commercial importance, the Phoenicians submitted easily, as a rule, to any powerful neighbor. Thus, after 850 B. C. they were in turn tributary to Assyria, Babylonia, Persia, Egypt, Greece and Rome. But the country maintained its commercial supremacy until after the capture of Tyre by Alexander, in 332 B. C.

Phoenix, *fe'niks,* a fabulous Egyptian bird, about the size of an eagle, with plumage partly red and partly golden. Of the various stories told of it by Herodotus and others, the most popular is to the effect that the bird, at an age of 500 years, conscious of its approaching death, built a funeral pile of wood and aromatic gums, which it lighted with the fanning of its wings. On this it died, and a young phoenix rose from the ashes. The Egyptians regarded it as a symbol of immortality.

Phoenix, Ari., the capital of the territory and the county-seat of Maricopa co., in the south central part of the territory, about 100 mi. n. w. of Tucson, on the Santa Fé, Prescott & Phoenix and the Southern Pacific railroads. The city is in a mining region, which also has good farming land in the valleys. It contains machine shops and stockyards and has a large trade in oranges, honey, grain, wine and mining products. The principal buildings are the capitol, the agricultural experiment station, the asylum for the insane, the courthouse, the city hall and several fine churches and schools. The city has electric street railways, electric lights, a public library, public and parish schools, a high school, the Sacred Heart Academy and Saint John's Indian School. The place was settled in 1870 and was incorporated in 1881. Population in 1900, 5544.

Phoenixville, Pa., a borough in Chester co., about 25 mi. n. w. of Philadelphia, on the Schuylkill River, at the mouth of the French Creek, and on the Pennsylvania and the Philadelphia & Reading railroads. It contains large iron-working establishments, such as rolling mills, blast furnaces and bridge works. There are also manufactories of cotton goods, hosiery, silk and other articles. The borough has a park, a hospital and a public library, and it owns the waterworks. It was settled in 1792 and was incorporated in 1849. Population in 1900, 9196.

Phonetics, *fo net'iks,* the science of elementary sounds of the human voice; also the art of representing these sounds by written or printed characters. In its broadest sense the term applies to all sounds of the voice, but in its restricted sense, and the one in which it is generally used, phonetics applies to articulate speech. Animals have voice, but man alone is gifted with speech. The sounds combined to form articulate speech are of two general classes, those consisting of tones produced simply by the vibrations of the vocal cords, and those in which these tones are broken up and given distinct articulation by the use of the tongue, palate, teeth and lips. The first class of sounds is represented in the English alphabet by the vowels *a, e, i, o, u, y*; the second, by consonants. Since the English language has forty elementary sounds, and there are but twenty-six letters in the English alphabet, some of these letters have to represent more than one sound, as is the case with *a, e, i* and *g*. This arrangement makes the English language somewhat difficult for foreigners to speak and write, and various attempts have been made to simplify it. The most far-reaching of these is that known as the spelling reform, in accordance with which many leading educators and scholars sanction and use a simplified spelling of several hundred words. This simplification consists in the omission of unnecessary letters, as in the words *abridgement* (reformed spelling, *abridgment*), *adze* (reformed spelling, *adz*); in the adoption of a simpler ending in place of that used in the old form, as in *cropped* (reformed spelling, *cropt*), *cursed* (reformed spelling, *curst*); in the dropping of a final consonant or vowel in case the word ends with double consonants or vowels, as *cutlass* (reformed spelling, *cutlas*); in the substitution of letters which primarily represent sounds, for letters which only secondarily, or by illogical usage, represent the same sounds, as in *enough* (reformed spelling, *enuf*) or in *browse* (reformed spelling, *browz*). This movement received a notable impetus through the endowment by Andrew Carnegie of a board, composed of leading American philologists, who shall, from time to time, suggest additions to the list of amended spellings. In 1906, also, an order was issued by President Roosevelt that all government publications should use, wherever feasible, the reformed spellings as proposed by this board. This order was afterwards rescinded.

Phonograph, *fo'no graf*, an instrument by means of which sounds can be permanently registered and afterward reproduced from the register. It consists essentially of a curved tube, one end of which is fitted with a mouthpiece, while the other end, about two inches in diameter, is closed with a disk, or diaphragm, of exceedingly thin metal. Connected with the center of this diaphragm is a steel point, which, when the sounds are projected on the disk from the mouthpiece, vibrates backward and forward. This part of the apparatus is adjusted to a cylinder which rotates on a horizontal axis. On the surface of the cylinder a spiral groove is cut, and on the axis there is a spiral screw of the same pitch, which works in a nut. When the instrument is to be used, a piece of tin foil is gummed round the cylinder, and the steel point is adjusted so as just to touch the tin foil. If words are now spoken through the mouthpiece and the cylinder is kept rotating, a series of small indentations is made on the foil by the vibratory movement of the steel point. These markings have an individual character of their own, due to the various sounds addressed to the mouthpiece, and when the point is made to pass over the cylinder the second time, the words spoken into the mouthpiece are reproduced. In phonographs now in use, cylinders covered with wax have taken the place of those covered with tin foil, and in some patterns, circular disks are used in place of cylinders. The mechanism used in recording sounds also differs slightly from that used in reproducing the same sounds. Both cylinders and disks are so constructed that they can be removed quickly. They can also be sent by mail, and thus one machine may give entertainments of great variety, with little expense to the operator. The sound is strengthened by the use of a large trumpet-shaped funnel, which is attached to the enunciating disk.

Phonography, *fo nog'ra fy*. See SHORTHAND.

Phosphates, *fos'fayts*, in chemistry, the general name for the salts formed by the union of phosphoric acid with bases or with water, or with both. They play a leading part in animal and plant life, the most important being the phosphate of soda, the phosphate of lime and the phosphate of magnesia. Phosphate of lime forms about 57 per cent of the bones and from 80 to 90 per cent of the teeth of animals, and it appears in the other tissues and fluids. In agriculture the adequate supply of phosphates to plants is a necessity in all deplenished soils. These phosphatic fertilizers consist for the most part of bones, ground bones, mineral phosphates, bone-ash and guano.

Phosphorescence, *fos for es'ens*, the property, which some substances possess, of giving off light after they have been exposed to light and then to darkness. Among the phosphorescent substances are barium, calcium, sugar and diamonds. Sometimes the phosphorescent light is brilliantly colored, and its color is known to bear a certain relation to the kind of light that fell upon it. Calcite gives an orange light after exposure to sunlight; argonite under the same circumstances gives a greenish light. Phosphorescence is a form of fluorescence (See FLUORESCENCE) and has nothing to do with phosphorus or with the shining of phosphorus, which is due to a chemical change.

The word is more loosely used to denote the property, which certain bodies possess, of becoming luminous without burning. In this sense, phosphorescence is sometimes a chemical, sometimes a physical, action. Certain mineral substances exhibit the phenomenon when exposed to the sun, to heat, to friction, to electricity or to cleavage. Rain, water spouts and meteoric dust sometimes present a self-luminous appearance. Several vegetable organisms, chiefly cryptogams, exhibit this kind of luminosity; but the most interesting cases of phosphorescence occur in the animal world, the species in which the luminous property has been observed belonging to nearly every main group of the zoölogical series. In some of the lowest life forms and in many of the jelly fishes, the whole surface of the body is phosphorescent; in other organisms the phosphorescent property is localized in certain organs, as in the sea-pens, in certain annelids, in the glowworms and in fireflies. The phosphorescence of the sea is produced by the bodies of certain microscopic marine animals, and it is seen on the surface of the ocean at night.

Phosphoric, *fos for'ik,* **Acid,** an acid containing phosphorus, hydrogen and oxygen, usually obtained by burning phosphoretted hydrogen in atmospheric air or oxygen. It is also produced by the oxidation of phosphorous acid, by oxidizing phosphorus with nitric acid, by the decomposition of apatite and other native phosphates and in various other ways. It is used in medicine in the form of a solution, or diluted acid, to relieve disordered conditions of the mucous membrane and to strengthen the system when disease has caused softening of the bones.

Phosphorus, *fos'for us,* a solid non-metallic substance which ranks as one of the elements. It occurs chiefly in combination with oxygen, calcium and magnesium, in volcanic and other rocks, whose disintegration constitutes very fertile soils. It exists also in the plants used by man as food and is an important part of animal structures. It is manufactured from bones, which consist in part of phosphate of lime, or from native mineral phosphate of lime. Common phosphorus, when pure, is almost transparent and colorless. At common temperatures it is a soft solid, easily cut with a knife, and the cut surface has a waxy luster. It melts at about 108° and is exceedingly inflammable. Exposed to the air at common temperatures, it undergoes slow combustion, emits a white vapor of a peculiar odor, appears luminous in the dark and is gradually consumed. On this account phosphorus should always be kept under water when it is desirable to preserve it. A very slight degree of heat is sufficient to inflame phosphorus in the open air. Gentle pressure between the fingers, friction, or a temperature not much above its point of fusion, kindles it readily. It burns rapidly, even in the air, emitting a splendid white light and causing intense heat. Its combustion is far more rapid in oxygen gas, and the light is far more vivid. Compounds of phosphoric anhydride with basic bodies are known as *phosphates.* When dissolved in fat oils, phosphorus forms a solution which is luminous in the dark. It is chiefly used in the preparation of lucifer matches and in the preparation of phosphoric acid. It is the most powerful and diffusible of all stimulants, but on account of its activity it is highly dangerous. It can be safely administered as a medicine only in extremely minute doses and with the utmost possible caution.

Photius, *fo'she us,* (about 820–about 891), a patriarch of Constantinople, born of patrician parents in that city. His wealth and interest raised him to the highest offices of the State, while he enjoyed the reputation of being the most universally learned and accomplished man of his age. He became secretary of state under the emperor Michael III and contracted an intimacy with the minister Bardas, uncle of the emperor. On the deposition of the patriarch Ignatius, Photius was raised to the patriarchal dignity. The installation was opposed by Pope Nicholas I, whom a council assembled by Photius soon excommunicated, thereby beginning the schism between the Eastern and Western churches. The emperor Michael was murdered in 867 by Basil, who was raised to the throne, and that prince immediately replaced Ignatius in his office and banished Photius, who, however, resumed his dignity on the death of Ignatius. On the accession of Leo, son of Basil, to the imperial throne, Photius was again deposed and banished to a monastery in Armenia, where his death took place. Photius was an able ecclesiastical statesman and was a man of great intellect, erudition and literary power.

Pho'to-Engra'ving, a process of engraving, by which the picture is first transferred to the block or plate by means of photography. The result is a printed surface, corresponding to the original from which the photographic image was taken. For a description of the different phases of the process, see ELECTROTYPING; HALFTONE; LITHOGRAPHY, subhead *Photo-Lithography;* PHOTOGRAVURE; ZINC ETCHING.

Photography, *fo tog'ra fy,* (Greek, *photos,* light, and *grapho,* to write), literally, the art of writing or drawing by light. It consists in the reproduction of portraits, scenes from nature or other objects, by the action of light upon a sensitized plate, placed in a camera.

Ordinary photography includes three processes—the exposure of the plate, or taking the picture; developing the exposed plate, or the negative, and printing the photograph, or the positive. The preparation of plates is an industry by itself, and the photographer obtains them ready for use. The plates used in studios and for most outdoor work are of glass, but for amateur work ribbons of film are extensively employed. The film has a back of celluloid and is put up in rolls, each roll containing a definite number of exposures. Since as good pictures can be produced by the use of one material as by the other, and film is very convenient for tourists, it is more desirable than glass for small cameras.

To obtain a good negative, the photographer must use care in making his exposure. The focus of the camera should be carefully adjusted; the instrument should be so placed that the light will fall upon the object, rather than upon the camera. The light upon the object should be such as to avoid sharp contrasts of light and shade, and the exposure should be timed according to the intensity of the light. The determination of the time is learned only by experience, and amateurs usually over-expose their plates. Views obtained by *snapshots* and *flash light* are results of instantaneous exposures. While very good negatives may be obtained in this way, they usually lack the detail of time exposures. The exposed plate does not show any trace of the picture.

The second step consists in the development of the negative. This must be done in the *dark room*, which is the photographer's laboratory. This room is fitted with shelves for holding the necessary chemicals and frames for holding the negatives. It should also contain a sink with running water and a drain pipe connected with a sewer. The room is dimly lighted with a small pane of red or orange-colored glass or by a red-glass lantern. The negative is developed by soaking it in a solution of pyrogallic acid or some other substance that will produce a like result. There are numerous developers in use, but the pyrogallic acid is more generally used than any other substance. The plate is laid in a shallow tray, face-side up, and the prepared liquid, called the *developer*, is poured upon it, after which the tray should be gently rocked to secure an even action of the developer upon all parts of the plate. In developing, the strongest lights and shades appear first, being followed by the more minute details. When these are all visible, the process should be stopped. This is done by removing the plate, washing in cold water and then placing in a bath of hyposulphite of soda, which dissolves the sensitive portion of the film not acted upon by the light. If the exposure and developing have been properly done, this last process should leave a clear, sharp negative. When taken from the hyposulphite bath, the negative should be thoroughly washed and then dried before being used for printing.

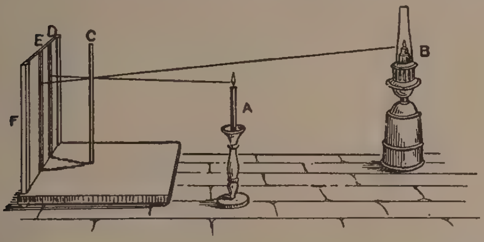
The picture developed on the plate is called the *negative*, because its lights and shadows are reversed, and in order to obtain a picture which resembles the object, a *positive* must be obtained. This is printed on prepared paper, the negative being placed face-side up in a frame, and the paper laid upon it and exposed to the light for a short time. After printing, the positive is *fixed*, by being soaked in a solution of hyposulphite of soda. It is then *toned*; that is, it is given its proper color by a solution of gold. After toning, the photograph should be thoroughly washed, to remove all traces of chemicals not solidified in the printing, otherwise the picture will fade and discolor. Many preparations for amateur work contain both the fixing and toning chemicals in the same solution, and devices for developing are in use which produce the finished negative by running the film through a specially prepared tank, containing the developer and so constructed that a dark room is not required. The great variety of effects seen is caused by the different methods of preparing the printing paper and the different ingredients used in toning solutions.

COLOR PHOTOGRAPHY. Pictures in natural colors are obtained by photography by the production of three negatives of the colored object, through screens of red, green and blue-violet glass, respectively. Glass positives of these negatives are made, and these are combined and projected through a magic lantern, producing a picture in the natural colors of the object. This process is also used in the so-called three-color printing, the halftone plates being made from negatives obtained by exposure through colored screens as here described. The colored picture is produced by printing from these plates, one after another.

HISTORY. The present degree of perfection in photography has been reached after years of study and invention. The first step in this art was the discovery, in 1809, by Thomas Wedgewood, of a way of making crude profiles by the action of light upon paper or cloth that had been soaked in a solution of nitrate of silver. Thirty years later Daguerre laid the foundation of photography by means of the process which bears his name. It consists of printing the picture on sensitized glass (See DAGUERREOTYPE). The use of sensitized paper was introduced by a Frenchman named Niepes, and about 1851 the present process of photography was established by an Englishman named Archer, who began the use of the negative as we now know it. From this discovery the various steps in the progress of the art have been in perfecting sensitized plates and paper and in improving the camera. See CAMERA; ELECTROTYPING; HALFTONE; LITHOGRAPHY; PHOTOGRAVURE.

Pho′tograv′ure, a process of engraving which combines photography and etching. A positive photograph of the drawing or photograph to be reproduced is made on glass. This is placed in a reverse position on a copper plate covered with a bituminous varnish, and the plate is then exposed to light. The portions of the varnish acted upon by the light are rendered insoluble, while those protected by the shadows remain unchanged. After exposure, the varnish is dissolved from the lines and the plate is etched. After etching it is "retouched" and improved with the graver. By the photogravure process the finest possible results are obtained, and it is extensively used for the production of large pictures, which rival the finest steel engraving in their delicacy and finish. It is also employed in the reproduction of photographs and smaller pictures for high class books. See ETCHING; PHOTOGRAPHY.

Photom′etry (Greek *phōs*, light, and *metron*, measure), the art of measuring the intensity of a source of light, by comparison with a standard of reference. Instruments called *photometers* have been devised for applying many different methods of measurement to each part of the spectrum of the light from each source. The degree of sensitiveness of the eye of the observer or a difference of sensitiveness between his two eyes affects the result. In other instruments used as photometers, what is measured is not the intensity of light, but the radiation of light. The relative intensity of light from stars is usually determined by a polarizing apparatus, which brings the brightness of the star above that of the standard of comparison. One method of measurement is shown in the figure. The rod C is so placed that the shadows E and D, which fall upon the screen F, are of the same degree of intensity. The relative intensity of the lights is determined by their respective distances from the screen.

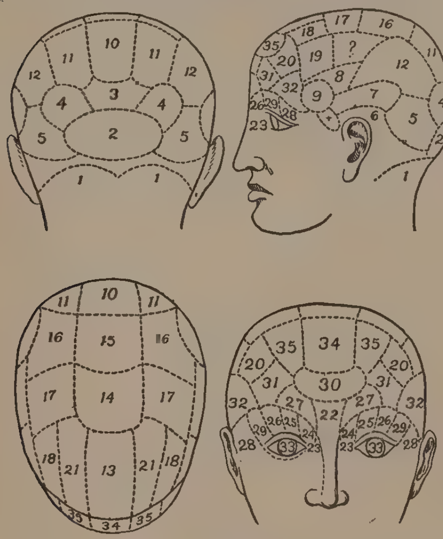


Pho′tophone, an instrument invented in 1880 by Prof. Alexander Bell. It resembles the telephone, except that it transmits sounds by means of a beam of light, instead of by the connecting wire of the telephone. The success of the instrument depends upon a peculiar property of the rare metal selenium, namely, that of offering more or less opposition to the passage of electricity, according to the action of light upon it. In its simplest form, the apparatus consists, at the receiving end, of a plane mirror of some flexible material, such as silvered mica, upon which a beam of light is concentrated. The voice of a speaker directed against the back of this mirror throws the beam of light reflected from its surface into undulations, which are received on a parabolic reflector at a distance and are centered on a sensitive selenium cell, in connection with a telephone, which reproduces in articulate speech the undulations set up in the beam of light by the voice of the speaker. The photophone is interesting more as a curiosity than for its utility.

Phrenology, *fre nol′o jy*, the name of a psychological theory, advanced by two Viennese physicians, Gall and Spurzheim, late in the eighteenth century. The fundamental beliefs on which the theory was based were that the brain was the organ of the mind; that it was a complex structure, composed of a number of different organs, at first estimated to be thirty-four and later forty-two in number; that each of these organs was the seat of a mental power or a sentiment; that the prominences in the skull indicated the location and size of the different organs and that any organ would increase in size and efficiency by the use of the power of which it was the seat. From this theory was developed a system of determining a person's aptitudes and characteristics by a process of examining the head. Charts showing the location of the different organs of the brain and marked with the mental power which each organ represented, were used, and the relative value of these organs was marked upon the chart when the person's head was examined.

Spurzheim came to the United States in 1832, but died soon after reaching this country. Nevertheless, phrenology gained a foothold here, and for a number of decades it had quite a large following, especially in rural districts and smaller towns. These places were visited by lecturers, who gave discourses on the subject and amused their audiences by examining the heads of those who were willing to submit to their manipulations.

More recent investigations show that the beliefs upon which phrenology was based were without foundation. Nevertheless, the advocates of this theory rank as pioneers in the study of the brain and the nervous system, and from this beginning the work of investigation advanced until many of the functions of the brain have been scientifically located. What is now known as *brain localization* is supported by well authenticated experiments. The figure illustrates a typical phrenological chart.



AFFECTIVE

I.—PROPENSITIES

1. Amativeness.
2. Philoprogenitiveness.
3. Inhabitiveness or Concentrativeness.
4. Adhesiveness.
5. Combativeness.
6. Destructiveness and Alimentiveness.
7. Secretiveness.
8. Acquisitiveness.
9. Constructiveness.

II.—SENTIMENTS

10. Self-esteem.
11. Love of Approbation.
12. Cautiousness.
13. Benevolence.
14. Veneration.
15. Firmness.
16. Conscientiousness.
17. Hope.
18. Wonder.
19. Ideality.
20. Wit. 21. Imitation.

INTELLECTUAL

I.—PERCEPTIVE

22. Individuality.
23. Form.
24. Size.
25. Weight.
26. Coloring.
27. Locality.
28. Number.
29. Order.
30. Eventuality.
31. Time. 32. Tune.
33. Language.

II.—REFLECTIVE

34. Comparison.
35. Causality.

Phrygia, *frij′e a,* in ancient geography, a region comprising the western central part of Asia Minor, containing the cities of Synnada, Laodicea and Colossae. The inhabitants were early civilized and paid much attention to grazing and tillage. The early history of Phrygia is mythological. Several of its early kings were famous in legend, especially Gordius (See GORDIAN KNOT) and Midas. On the death of Adrastus, the royal family of Phrygia became extinct and the kingdom became a province of Lydia. It afterward formed a part of the Persian, and still later, of the Roman, Empire.

Phtha, *thah,* an ancient Egyptian divinity, the creator of all things and the source of life; as such, father and sovereign of the gods. He was worshiped chiefly at Memphis, in the form of a mummy or of a pygmy.

Phylloxera, *fil loks′ur a,* a genus of plant lice, the typical form of which does great damage in vineyards. This species, which has become widespread, has attracted much attention of late years. It presents itself in two types, the one gall-inhabiting and the other root-inhabiting. Its proper home is North America, where it was known early in the history of grape culture, and where it doubtless existed on wild vines from time immemorial. Phylloxera were discovered in England in 1863, and about the same time they made their appearance in France, where they inflicted immense loss upon owners of vineyards. Widening their area, not only by natural means, but also by commerce in vines and cuttings, phylloxera spread to all grape-growing countries of Europe. Only where the soil was of a sandy nature did the vineyards escape. Generally speaking, the pest has now obtained a foothold, at least in restricted localities, in every country where the grapevine is cultivated. Vines attacked by phylloxera generally show external signs during the second year, in a sickly yellowish appearance of the foliage and in stunted growth, and the third year they frequently perish, all the finer roots having decayed and wasted away. Many remedies have been proposed, but none is universally practicable or satisfactory.

Physical, *fiz′ik al,* **Geog′raphy.** See PHYSIOGRAPHY.

Physical Training. See ATHLETICS.

Physick, *fiz′ik,* PHILIP SING (1768–1837), an American surgeon, born in Philadelphia, Pa., and educated at the University of Pennsylvania. In 1805 he was made professor of surgery in the University of Pennsylvania. One of his most brilliant successes was a remarkable surgical operation on Chief Justice Marshall, which resulted in a perfect cure He introduced numerous valuable instruments and improved modifications of others, and he applied many novel methods of treatment. He was called the "Father of American Surgery."

Physics, *fiz'iks*, the science which treats of the properties of matter and force, or energy. Physics is one of the oldest organized branches of natural science and was formerly known as *natural philosophy.* Originally it included mathematics, physics proper, chemistry, natural history, astronomy and geology, but with the development of science, each of these branches was organized as a separate science and treated by itself. The relation of these various branches to physics is shown in such subdivisions of them as geological physics and chemical physics. For a long time chemistry was supposed to be entirely distinct from physics, but the growth of each of these branches of science has brought them so close together that they are now found to be intimately related. The various subjects of physics in this work are treated under such titles as DYNAMICS; ENERGY; ELECTRICITY; GRAVITATION; HEAT; HYDRAULICS; LIGHT; MAGNETISM, and kindred topics. Also, see CHEMISTRY.

Physiog'nomy, the art of judging character from the countenance. Aristotle is the first who is known to have made any attempts in physiognomy. He observed that each animal has a special predominant instinct; for instance, the fox has cunning and the wolf has ferocity. He concluded that men whose features resemble those of certain animals will have similar qualities to those animals. The theory was adopted and illustrated by the French painter Lebrun, in the seventeenth century. Lavater was the first to develop an elaborate system of physiognomy, the scope of which he enlarged so as to include all the relations between the physical and moral nature of man. Physiognomy is closely related to phrenology, and the elaboration of phrenology by its leading advocates in the United States consisted largely in adding to it systems of craniology and physiognomy (See PHRENOLOGY). Physiognomy is of general interest and to a limited extent is practiced by every one. We are invariably influenced by the appearance of the face, in forming an estimate of one's character and ability.

Physiog'raphy, in its original meaning, that department of physical geography which explains the forms of the earth's surface; but in its present meaning in the United States, the entire science of physical geography. It treats of the surface of the earth or any part of it, as regards its natural features and the changes that are constantly taking place or have taken place on it. It points out the natural divisions of land and water, such as continents, hills, rivers, seas and oceans. It treats of the external form, extent and location of mountains and valleys and of the outline and characteristics of coasts; also, of the relation and peculiarities of different portions of the earth's surface covered by water, including currents, wave action, depth of the sea, salt and fresh water lakes and the drainage of continents and countries. It treats of the atmosphere, especially in its relation to climate, and it discusses winds, storms, rainfall and general meteorology. It also treats of life upon the globe, especially of the distribution of plants and animals and their relation to their environment, tracing the influence of climate, soil, natural barriers or channels of communication upon the growth and spread of plants and animals, and especially upon the location and development of the various races of men. Physiography is very closely associated with all other branches of natural science.

The agencies which are still producing changes upon the earth's surface are the atmosphere, water and heat. The atmosphere causes changes through winds and rainfall. By these, hard portions of rock are disintegrated and loose portions are carried from higher to lower levels. Water is by far the most powerful agent in producing changes upon the earth's surface. It causes these changes through erosion, freezing and thawing, all of which disintegrate the rocks and aid chemical action, and by the operation of waves and tides. Heat, which is the great internal force of the earth, causes changes by producing changes of temperature and by volcanic action. While the exact condition of the interior of the earth is not known, it is generally conceded that the rise and fall of continents and other great movements which occur either gradually or instantly are due to contraction of the earth's crust, caused by the gradual cooling of the interior. In volcanic regions the surface is frequently changed by eruptions. (See EROSION; RAIN; WIND.)

See VOLCANO; EARTHQUAKE; GEOGRAPHY; GEOLOGY. Consult *Physiography of the United States*, by the National Geographic Society, and Shaler's *Aspects of the Earth.*

Physiology, *fiz i ol'o jy*, that branch of science which deals with the functions, properties, changes and actions of the living body, either animal or vegetable. This article deals with the former. The knowledge of physiology has been gained by observation, by experiment and by studying the conditions in disease. The greatest advancement has been made since Harvey discovered the circulation of the blood, though much work of a valuable kind was done by the early Egyptians and Chinese and the philosophers of Greece. Hippocrates (450 B. C.), the father of medicine, first showed that disease was due to natural causes. Galen (150 A. D.) proved that the arteries contain blood and not air; that the brain, spinal cord and nerves are the organs of intelligence and sensation, and that the nerves of sensation and motion are distinct. In the sixteenth century it was learned that the lungs purify the blood. Then followed, in the seventeenth century, Harvey, Malpighi and Leeuwenhoek; Haller, in the eighteenth; Müller, in the nineteenth, with Cuvier, Schwann, Von Mohl, Hall, Weber and Darwin, all of whom have added contributions that have made physiology the valuable science it is to-day.

The functions of the body are growth, reproduction, motion, nutrition and those movements connected with the nervous system, all of which have been treated of more or less fully under BRAIN; DIET; DIGESTION; FOOD; LACTEALS; LYMPH; MUSCLE; RESPIRATION; SECRETION; SENSES, SPECIAL; NERVOUS SYSTEM, and kindred topics.

Pi. See CIRCLE.

Piacenza, *pe a chen'tsa,* a city of northern Italy, the capital of the Province of Piacenza, nearly equidistant from Parma and Milan, near the confluence of the Trebbia with the Po. It has broad, regular streets and some beautiful buildings, but it is nevertheless a desolate-looking city. There is a fine cathedral, begun in the eleventh century, besides several other notable churches, the great Palazzo Farnese, now used as barracks, a public library and a beautiful theater. The city is an important railway center and has manufactories of silk, cotton and woolen goods, stockings, hats, leather and machinery. Piacenza was originally a Roman colony and was founded in the third century B. C. From the sixteenth century on, the city shared the fortunes of Parma. Population in 1901, 36,064.

Pian'o or **Pian'oforte,** a musical stringed instrument. The strings are extended over bridges, resting on a thin wooden vibrating sounding board, and are made to vibrate by means of small felted *hammers,* which are put in motion by levers connected with *keys,* pressed by the fingers of the performer. There are also *dampers,* which deaden the sound after the note is struck.

The name *pianoforte* is compounded of two Italian words, signifying *soft* and *strong,* and the piano was so called in distinction to the harpsichord, the instrument which it superseded, in which it was not possible to increase or diminish at will the strength of the notes. The mechanism by which the movement of the keys is conveyed to the strings is called the *action,* and in no part of the instrument is careful adjustment of parts more necessary, in order to produce an agreeable and firm quality of tone. When these parts are correctly adjusted, a skilful performer, by carefully controlling the force with which he strikes the keys, as well as the manner of striking, can produce tones of widely different quality, to accord with the purpose and meaning of the composition. There are usually three strings for each note, in the higher and middle octaves, two in the lower and one in the lowest notes. The strings are of steel wire. The lowest notes have their strings wound round with a double coil of brass wire, and those next above are wound round with a single coil. All pianos have two *pedals,* and some have more. These are worked by the feet, and when pressed down, by moving the hammers or dampers, with relation to the strings, they regulate the intensity of the stroke of these mechanisms and consequently control the quality and intensity of the sound.

Pianos are either *grand pianos,* in which the strings lie in the direction of the keys, or *upright pianos,* which have the strings stretched vertically, perpendicular to the keys. Recently a variety called the *upright grand* has also been introduced. The common compass of the piano at present is six and seven-eighths or seven octaves.

The invention of the piano can scarcely be ascribed to any one man. The first satisfactory hammer action appears to have been invented by an Italian of Padua, named Bartolommeo Cristofali, about 1711. The instrument was not introduced into England till the latter half of the eighteenth century. Among the principal improvers of the pianoforte are Sebastian Erard, the founder of the celebrated firm still in existence; Roller et Blanchet, the French firm, which introduced the upright piano; Collard, Bechstein; Steinway, and many others.

Pianoplayer, any one of many instruments designed for playing a piano automatically. There is a little hammer opposite each piano key, except those at the extreme ends of the keyboard, the hammers being operated by air pressure, produced by a bellows operated by the feet of the performer. The action of each hammer depends upon the suction of air into its tiny compartment, the suction being regulated by the passage of a sheet, previously perforated to correspond to a selection of music, over a row of tiny openings. By means of levers and strings the speed at which the sheet moves, and, therefore, the time of the music, can be very closely regulated; also, the intensity and duration of the tone. However, there is always a mechanical regularity in the music.

Pias'ter or **Pias'tre,** the monetary unit of Turkey, a silver coin equivalent to about $4\frac{2}{5}$ cents of American money. Silver half-*piasters,* copper *piasters* (equivalent to $\frac{1}{10}$ the silver *piasters*), copper *paras* (equivalent to $\frac{1}{40}$ of the silver *piaster*), silver 20-*piasters,* gold 25-*piasters,* gold 100-*piasters* and gold 500-*piasters* are also coined. The same name is applied to coins of other nations. The Egyptian *piaster* is about one one-hundredth of the English pound sterling, or about five cents. The Spanish *piaster* is the same as the *peseta.*

Pick'ens, Andrew (1739-1817), an American soldier, born at Paxton, Pa. He removed to South Carolina in 1752, fought in the wars against the Creeks and Cherokees in the following years and at the outbreak of the Revolutionary War became brigadier general of the state militia of South Carolina. Throughout the struggle he exhibited the greatest bravery, in command of an independent partisan force, and he especially distinguished himself at the battles of Cowpens and Eutaw Springs. He was a member of the state legislature from 1783 to 1794, served one term in the Federal Congress, returning to the legislature in 1801, and retired in 1812.

Pickens, Francis Wilkinson (1805–1869), an American statesman, born in South Carolina, educated at South Carolina College and admitted to the bar. He was elected to the state legislature, where he advocated nullification. In 1834 he was elected to Congress and served for five successive terms. In 1857 he was made United States minister to Russia, but at the outbreak of the Civil War he returned to America and was elected governor of South Carolina. He was a zealous secessionist, early organized an independent government and demanded the surrender of Fort Sumter. This being refused, he erected the batteries which later caused the fall of the fort.

Pick'erel. See Pike.

Pick'ering, Timothy (1745–1829), an American statesman, born at Salem, Mass., educated at Harvard University and admitted to the bar. During the pre-Revolutionary period, he was conspicuous as the author of numerous patriotic pamphlets. He served during the war in the Revolutionary army, became a member of the board of war and in 1791 was appointed postmaster-general of the United States. Four years later he became secretary of war, and in this position he established the military academy at West Point and furthered the construction of a navy, of which the *Constitution* and the *Constellation* were begun during his term. He succeeded Edmund Randolph as secretary of state, but was removed in 1800 on account of a disagreement with President Adams. He soon moved from Pennsylvania to Massachusetts, where he was elected chief justice of the court of common pleas, and in 1803 he entered the United States Senate. Eight years later he was elected to the House of Representatives, where he served until 1817.

Pick'et. See Piquet.

Pick'ett, George Edward (1825–1875), an American soldier, born in Richmond, Va. He graduated at West Point and served with distinction in the Mexican War, also on the Western frontier, but at the opening of the Civil War he resigned from the army and became a major in the Confederate service. He was gradually promoted until he became major general, on account of distinguished service in the Peninsula campaign. He fought at Fredericksburg and led the famous charge at Cemetery Ridge in the Battle of Gettysburg. During the remainder of the war he held numerous important commands, and at its close he engaged in business in Richmond.

Pickles, vegetables and certain fruits, first steeped in strong brine and then preserved in close vessels. Wood vinegar is often used, but malt or wine vinegar produces the best pickles. Owing to the corroding effects of brine and vinegar, the use of metallic vessels should be avoided in making pickles. To give a green color to pickles, verdigris and other poisonous compounds of copper are sometimes employed by manufacturers. Cucumbers, green tomatoes, olives and limes are extensively used in the manufacture of pickles.

Pi'cric Acid, a solid acid and bitter substance, obtained by the action of nitric acid on organic substances; also, by adding nitric acid to a mixture of carbolic acid and sulphuric acid. It was formerly of great importance in dyeing, giving a bright yellow color. It is now most largely used in making explosives, sometimes by itself, sometimes in combination with potash, soda or ammonia.

Picts, the name given to the ancient Caledonians, usually regarded as a Celtic race, inhabiting North Britain till the beginning of the sixth century.

Piedmont, *peed'mont*, a territorial department of the north of Italy. It is surrounded by Switzerland, Lombardy, Liguria and France and has an area of about 11,300 square miles. It forms the upper valley of the river Po and derives its name, which means "Foot of the Mountain," from its station at the base of the loftiest ranges of the Alps, by which it is enclosed on all sides, except toward the Lombard plain. It forms one of the most fertile and beautiful parts of Europe, descending from the north, south and west in slopes and terraces to the plains of the Po. It produces, extensively, wheat, maize, rice, hemp, sugar beets and fruits and large quantities of silk. Population in 1901, 3,317,401. Piedmont formed the most important part of the kingdom of Sardinia. See SARDINIA, KINGDOM OF.

Piedmont Region, a name given to the part of the Atlantic coastal plain in the United States, situated between the Appalachians and thecoastal plain proper. In general, the boundary between the Piedmont region and the coastal plain is marked by the Fall Line, which also discloses the geological difference between the two regions. The Piedmont plain consists of older and harder rocks. In New England the Piedmont region is not clearly evident, but in the extreme south it broadens to a width of nearly 300 miles.

Pier, *peer*, in architecture, the name applied to a mass of masonry between openings in a wall, such as doors or windows, and to the solid support from which an arch springs or which sustains a tower. In medieval architecture the pier was a square column. The term is also applied to a mole or jetty carried out into the sea, intended to serve as an embankment to protect vessels from the open sea and to form a harbor.

Pierce, FRANKLIN (1804–1869), an American statesman, fourteenth president of the United States. He was born at Hillsborough, N. H., and was educated at Bowdoin College, where he was the friend and associate of Nathaniel Hawthorne, Sargent S. Prentiss and Henry Wadsworth Longfellow. He studied law, was admitted to the bar in 1827 and was chosen to the state legislature, to which he was three times reelected. In 1832 Pierce was elected to the Federal House of Representatives, where he served until elected to the United States Senate in 1837. At his election he was the youngest member of that body, but soon became conspicuous as an eloquent supporter of President Jackson, though somewhat overshadowed by such men as Benton, Clay, Calhoun, Webster and Silas Wright.

He resigned before completing his term and resumed the practice of law at Concord, N. H., consistently declining many offers of public office. However, he still took active interest in political affairs and was a frequent counselor of the leaders of the Democratic party. At the outbreak of the Mexican War, Pierce entered the service as a private soldier, but was soon made a brigadier general of volunteers and participated in the battles of Vera Cruz, Contreras and Churubusco.

FRANKLIN PIERCE

Returning to New Hampshire, he was made presiding officer of the state constitutional convention, and in 1852 he became the candidate of the Democratic party for the presidency, being nominated as a compromise candidate after a long struggle between Buchanan, Douglas, Cass and Marcy. He was elected by an electoral vote of 254 to 42, carrying all but four of the states. He chose a cabinet of exceptional ability and distinction, which was also remarkable for the fact that it was not changed during his administration. Among the important events of his term were the Gadsden Purchase, the conclusion of commercial treaties with Great Britain and Japan, the promulgation of the Ostend Manifesto and the passage of the Kansas-Nebraska Bill. As president, Pierce failed to maintain his reputation as a statesman of extraordinary ability, and his policy upon the slavery question aroused considerable discontent in the Northern states. At the close of his term he spent several years in travel, but took no further part in politics.

Pigeon, *pij'un,* the name given to a large group of birds, of which the dove is the best representative. There are over 500 species, many of which are natives of the islands in the Pacific Ocean. Most pigeons are of medium size, and they generally build flimsy nests in trees, laying two eggs, on which both birds sit in turn. The color of most pigeons in the temperate regions is a dull gray, brown or slate, though some are black and white; but those of the tropical regions have bright shades of blue and purple. The largest of the wild pigeons are the *gouras* of Papua and adjacent islands. These birds are more than two feet long, wear large and showy crests and have a rich color. In the United States the *passenger* pigeon (See PASSENGER PIGEON) and the *mourning dove* are the representatives of the wild pigeons. The *common pigeon,* or *dove,* is derived from the wild *rock dove* of Europe. *Turtledoves* are small pigeons found in most parts of the world. They have strong powers of flight and are difficult to domesticate. The *fantails* are so named from their large erect tails, which open like a fan. The *pouters* swell up their crops until they are very large and give the bird a ridiculous appearance. The *jacobins* are distinguished by a big ruff of feathers about their necks and heads. The *tumblers* turn somersaults in the air during their flight. Some of these and other varieties are very handsome and command a high price from people who fancy them. The *homing* pigeon, also called the *carrier* pigeon, has a remarkable sense of direction and great power of flight (See CARRIER PIGEON).

Pig'ments. See PAINTS.

Pig'weed, a plant belonging to the Amaranth family, native to tropical America, but now common in the United States. It has dull green leaves and crowded spikes of small greenish flowers. The plant is tall and straight and is without spines. To eradicate this plant, prevention of its seeding, thorough cultivation of the soil and uprooting of the plant as far as possible are necessary. The pigweed is often called *beetroot,* because of its red root.

Pi'ka, the common name for several different little animals, which are known as *calling hares,* or *conies,* or, in the case of the species common in the western United States, *starved rat* or *little chief hare.* All of them are more like guinea pigs than like hares and are timid and quite harmless. The American species, which is found in the mountains usually just above the timber line, lives upon grass, which it cuts, dries and stores away with dried vegetables for its winter fodder.

CALLING HARE

Pike, the name of a group of fishes found in the fresh waters of both Europe and North America. In the United States this fish is commonly known as the pickerel. It has a long, slender body, with a long head and large mouth. It is very voracious and destructive to smaller fish. The pickerel is a fine game fish and is usually taken by hook and line. The flesh is somewhat coarse and has not as good a flavor as the salmon or trout, yet the fish is quite highly prized for food. The so-called *wall-eyed pike,* or *wall-eye,* common to northern lakes, is really a species of perch. See PERCH.

Pike, ZEBULON MONTGOMERY (1779–1813), an American soldier and explorer, born at Lamberton, N. J. He was taken in childhood to eastern Pennsylvania, where he entered the army, becoming first lieutenant in 1800. Five years later he led an exploring expedition into the territory of the Louisiana purchase, and in the following year he started upon a similar journey. On this expedition he reached the site of Pueblo, Colo., discovered Pike's Peak, which was named for him, and was captured by the Spanish while searching for the Red River, but was later released. He was soon promoted in the army to the rank of colonel and was nominated brigadier general, but he died before the Senate acted upon his name. He was killed by an explosion in the expedition against York, Canada, in the War of 1812.

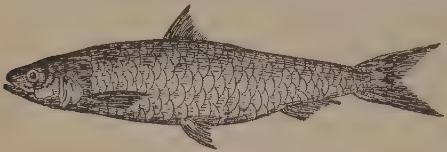
Pike Perch, a genus of fishes, closely allied to the perch, but showing a resemblance to the pike in its elongated body and snout. Like the pike, it is a dangerous enemy to other fresh-water fishes, but the flavor of its flesh is excellent. It is usually under two feet in length, though certain species grow larger than this. It occurs in the fresh waters of the Great Lakes, the Upper Mississippi and the Ohio, in the streams of Europe and in western Asia.

Pike's Peak, one of the highest summits of the Rocky Mountains, in the center of the State of Colorado. It is 14,107 feet in height and is capped with snow. Its sides are covered with pine forests to a height of almost 12,000 feet. A rack-rail railway takes tourists to the summit during the summer.

Pilas'ter, in architecture, a square pillar, projecting from a pier or a wall to the extent of from one-fourth to one-third of its breadth. Pilasters originated in Grecian architecture. In the Roman, they were sometimes tapered like columns and finished with capitals, modeled after the order with which they were used. In the early Renaissance ornamental pilasters were very common. See COLUMN.

Pi'late, PONTIUS, the fifth Roman procurator of Judea, who succeeded Valerius Gratus in 26 A. D. Nothing is known of his early history. He was a narrow-minded and impolitic governor, and at the very beginning of his term of office his acts led to commotions among the Jews at Jerusalem. When Christ had been condemned to death by the Jewish priests, who had no power of inflicting capital punishment, he was carried by them to Pilate to be executed. Yielding to the clamors of the Jews, the Roman governor ordered Jesus to be crucified, but he permitted Joseph of Arimathea to take his body and bury it. Pilate was afterward removed from his office by Vitellius, prefect of Syria, 36 A. D., and, according to tradition, he was banished by Caligula to Vienna (Vienne), in Gaul, where he is said to have died or committed suicide some years after.

Pil'chard, a species of fishes included among the herrings, which they much resemble, though they are rather smaller. Pilchards frequent the coasts of Britain all the year round. The usual spawning time is October, when they are found in great abundance on the southern coasts of England, the Cornwall fisheries being the best known. Pilchards are chiefly consumed in Spain, Italy and France during Lent and other fasting seasons. Many of the commercial sardines are in reality young pilchards.



PILCHARD

Pilcomayo, *peel ko mah'yo,* a river of South America, which rises in Bolivia in the eastern slope of the Andes, flows southeast and falls into the Paraguay near Ascuncóin, after forming part of the boundary between Paraguay and the Argentine Republic. Its entire length is estimated at 1200 miles. On account of its shallowness during the dry season and the strong currents in the narrow places, the river does not appear likely to become useful for navigation.

Pile, a long post, driven into soft earth, to support a building or to make a defense against water. In the former case a pile is usually a log of wood, sharpened at the point, which sometimes is protected with an iron shoe, to enable it to penetrate the harder strata of the earth. The most common purpose to which piles are applied in temporary structures is to make cofferdams (See COFFERDAM). The piles used are now often of cast iron or concrete, sometimes solid and sometimes hollow. Piles are driven by a heavy iron block, raised and let fall alternately, this in extensive works being accomplished by means of machinery operated by steam.

Pil'grims, the name first applied by William Bradford to the body of English Separatists who established the first English settlement in Massachusetts, at Plymouth. They had removed from England to Leyden, Holland, in 1608, and in 1620 they had migrated to America. They are also called "the Pilgrim Fathers." See PLYMOUTH COLONY: MASSACHUSETTS, subhead *History*.

Pil'lory, a frame of wood, erected on posts, with movable boards, so notched as to form holes, when closed, through which were put the head and hands of a criminal for punishment. In this manner convicted persons were exposed to public view and to insult. It was a common punishment in America during colonial days.

Pil'low, GIDEON JOHNSON (1806–1878), an American lawyer and soldier, born in Williamson County, Tenn., and educated at the University of Nashville. He began the practice of law in Columbia, Tenn., in 1828, and at the outbreak of the Mexican War he entered the army and was made brigadier general, in command of the Tennessee troops. He participated in all the important battles and became major general in April, 1847. He was tried for insubordination, but was acquitted, and he returned to the practice of law. He entered the Confederate army at the opening of the Civil War, became a brigadier general, opposed Grant at the Battle of Belmont and was second in command at Fort Donelson, but escaped before the fort surrendered. In the later years of the war he was entrusted with minor commands.

Pills'bury, Charles Alfred (1842–1899), an American manufacturer and capitalist, born in New Hampshire. He early removed to Minnesota, settling at Minneapolis, where, in the course of the next few years, he founded the milling company which soon built the largest flour mills in the world. In 1889 he became the head of a syndicate which controlled the Pillsbury-Washburn mills. He owned many patents on machinery for the improvement of the milling process and introduced many valuable devices. He was United States senator from Minnesota as a Republican from 1877 to 1887.

Pillsbury, John Sargent (1828–1901), an American merchant and politician, born at Sutton, N. H. When twenty-seven years of age he removed to Minnesota and engaged in the hardware business at the Falls of Saint Anthony, now Minneapolis. He afterwards became interested in the lumber trade, and later, with his brother, Charles A. Pillsbury, he founded the largest flour-producing establishment in the world. He was for twelve years state senator, was governor of Minnesota from 1876 to 1882 and was a member of the board of regents of the state university for forty years. During his administration as governor he secured the payment of the state debt, which had been repudiated years before. He gave Science Hall, costing $150,000, to the University of Minnesota.

Pi'lot, a person qualified to navigate a vessel within a particular district. In many countries ships are compelled to take on or carry licensed pilots upon entering certain waters. In the United States the power of regulating pilots is in the hands of Congress, but many states legislate for their own territory, subject to general rules established by Congress.

Pilot Fish, a genus of fishes included in the mackerel family. It is silver gray in color, with five blue-black bands around the body, and is about a foot in length. The pilot fish was formerly supposed to act as a pilot to the mariner and is still supposed to act as such to sharks. It often follows in the wake of ships for long distances, associating with sharks and devouring the refuse thrown overboard.

Pil'sen, a town of Bohemia, situated in a valley at the confluence of the Radbusa and the Mies, 52 mi. w. s. w. of Prague. It consists of the city proper, a well-built town with promenades on the site of the old ramparts, and several suburbs. Saint Bartholomew's Church, which dates from the thirteenth century, a Renaissance townhall and a number of museums are among the most noteworthy buildings. The chief article of manufacture and commerce is the famous Pilsener beer. Coal, iron and alum are found in the neighborhood, and there are manufactures of bells, glass, wire, paper and pottery. During the Thirty Years' War, Pilsen was for a time the headquarters of Wallenstein. Population in 1900, 27,232.

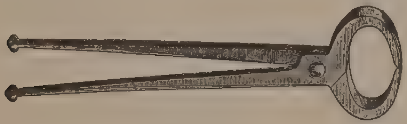
Pima, *pe'ma,* one of the principal indian tribes living in southern Arizona and northern New Mexico. Once they were Pueblo indians, living farther north, but having been driven south, they built small, dome-shaped dwellings of brush, covered with earth and straw. They are agricultural in their habits, and the women weave water-tight baskets and make pottery. There are about 5000 persons in the tribe.

Pin, a piece of wire, generally of brass, sharp at one end and blunt, with a head, at the other. By the old methods of manufacture by hand, the distinct processes, from the straightening of the wire to the spinning and hammering of the head, were usually fourteen. Among the most important improvements in the making of pins are the machines by which the head is formed from the pin itself and the machine for sticking the pins in paper—both American inventions. Solid-headed pins, now universally used, were first made in 1824. The consumption of pins in the United States is estimated at thirty millions a day.

Pin Making. Pins are made from brass wire (See Wire). The wire is wound on a large reel, which is hung over the pin-making machine. In this machine the pin is cut from the wire, headed, pointed, sharpened and polished. This machine is a combination of steel fingers, rollers, cams, toggle joints, headers, revolving files and belts. The wire, caught by a pair of rollers, is drawn forward into the machine, where it is cut into the right lengths; two raps from a cam and toggle form the head. A steel finger puts the headed wire on a wheel under the heading dies, and the pointless pin is carried down between two revolving steel disks. One of them revolves faster than the other, so the pin is turned round as it travels forward. Just at this point, it comes in contact with four revolving files, which point the pin, and then an emery belt puts the first polish on it. The pins drop from the machine at the rate of 160 a minute and fall into a hopper, from which they are taken to the tinning room. In passing from the pin machine, the pins become covered with oil and dirt, and this is removed by putting them into a revolving iron barrel, with sawdust. The tinning process consists in the pins being boiled for four hours in a preparation of pure tin. They are then washed with strong soapsuds, to give them a smooth surface. After being rolled through the sawdust again, they are ready to be stuck into papers.

The sticking machine crimps the paper and sticks the pins in at the same time. The pins are put in a hopper, from which an inclined steel plate, furrowed with little runs, or channels, leads to the machine. The pins are caught by revolving steel fingers and pushed forward upon the inclined plate into the runs. The runs converge to a plate, which moves slightly back and forth across the rows of slots. This cutting off plate catches the pins, and when the holes are full a number of little rams or hammers shove the pins into the crimp of the paper which is formed a second before the pins are stuck in. Black, or mourning, pins are made from iron wire and are japanned.

Pinch'ers, a common tool, composed of two handles and two jaws, working on a pivot. It is used for grasping an object and holding it fast.



PINCHERS

There are many patterns of pinchers, such as those used by blacksmiths and those for cutting wire, usually called nippers. Small pinchers are usually called pliers. Punch pliers have a hollow punch fastened to one jaw; they are used for punching holes in leather and paper.

Pinck'ney, CHARLES (1758–1824), an American statesman, born at Charleston, S. C. At the age of twenty-one he was chosen to the provincial legislature, was sent to the Continental Congress in 1785 and was a member of the Federal constitutional convention two years later. He was three times governor of South Carolina, from 1789 to 1792, from 1796 to 1798 and from 1806 to 1808. Meantime, he served as United States senator, as minister to Spain and in the state legislature. He also served in the national House of Representatives from 1819 to 1821, where he opposed the Missouri Compromise.

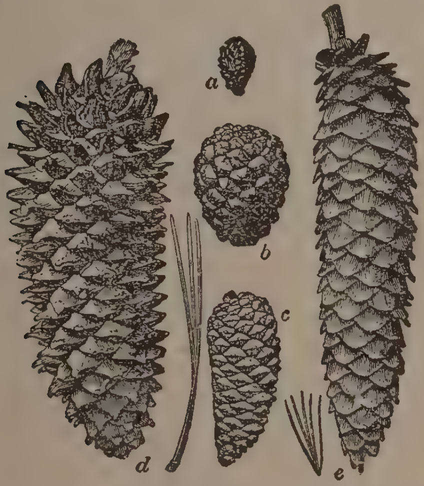
Pinckney, CHARLES COTESWORTH (1746–1825), an American statesman, born at Charleston, S. C. In the Revolutionary War he displayed great bravery, and for two years he was a prisoner of war. In 1787 he was member of the convention that framed the Constitution. As minister to France in 1796 he uttered the famous words which soon became a war cry in America, in response to a demand by Talleyrand for a bribe, "Millions for defense, but not one cent for tribute." He was twice the unsuccessful candidate of the Federalists for president.

Pinckney, THOMAS (1750–1828), an American diplomat and soldier, born at Charleston, S. C. He was educated in England and was there admitted to the bar, but returned to Charleston in 1772, served in the Continental Army during the Revolutionary War and was captured at Camden. After the war he was elected governor of the state, was later minister to England, and in 1794 was special commissioner to Spain, where he negotiated a treaty granting free navigation of the Mississippi. In 1796 he was the candidate of the Federalists for vice-president. He later served one term in Congress. He also fought in the War of 1812 as major general.

Pin'dar (about 522–about 445 B. C.), the greatest of the lyric poets of Greece, born in Boeotia, in or near Thebes, of a noble family. At an early age he was instructed in music and poetry; and for the development of his poetical talent he was sent to Athens. In after life he showed himself a great admirer of Athens and the Athenians, who rewarded him for the honors he paid to them by making him a public guest of the city and giving him a present of 10,000 drachmas. After his death they erected a statue in his honor. He was held in great esteem by many princes of Greek states, for whom he composed choral songs, and he was supposed to be an especial favorite of the Delphic oracle. He practiced all kinds of lyric poetry, but the only remains we have of his work are his *Hymns of Victory,* odes written to celebrate the victors in the great Grecian games.

Pine, the most numerous trees of the cone-bearing family. There are about thirty-five species found in North America, and nearly as many more are known in other parts of the world. The pine is characterized by its long, evergreen, needle-shaped leaves, which grow from a sheath in clusters of from one to five. Its branches are arranged in whorls and project nearly horizontally. The bark is reddish-brown, and the wood is fine-grained and adapted to many uses. In accordance with the quality of the wood, pine is classed as *hard pine* and *soft pine*. In some localities the hard pine is called *pitch pine*.

The *white pine* is common from Canada to North Carolina and Georgia, along the Appalachian Mountains and westward to Tennessee. In the northern part of this belt, the trees extend westward to Minnesota, while extensive forests are found in Canada, along the Saint Lawrence and Ottawa rivers as far west as Lake Superior. The tree often attains a large size, being from 70 to 150 feet in height and sometimes having a diameter of 7 feet, though trees of this size are rare. The wood is white, soft, fine-grained and durable, and it is the most useful wood in the world for lumber. This tree has been the chief source of lumber in the United States and Canada for more than 250 years. Maine, Michigan, Wisconsin and Minnesota have been the great lumber states, but the lumbering industry has caused their forests to be rapidly depleted, and in some localities they are practically denuded of merchantable timber. The annual cut of white pine in the United States amounts to about 7,500,000,000 feet and is valued at more than $95,000,000.



PINE CONES

a, Cone of the dwarf Mugho pine; *b*, cone of the Italian stone pine; *c*, cone of the cluster pine; *d*, cone and needle of the great-hooked, or Coulter's pine; *e*, cone and needle of the sugar pine.

The *yellow pine* or *Georgia pine* is found in the Southern states, from North Carolina to Florida and westward to the Mississippi, and in detached forests in Arkansas, in some portions of Louisiana and in Texas. The wood is of a color darker than that of the white pine; it is hard and fine-grained and it contains considerable pitch. It forms a strong and elastic lumber and is especially valuable in the construction of ships, bridges, viaducts and frames for large buildings. It is also used for flooring and inside finishing. This tree is also the source of tar, turpentine and resin (See TAR; TURPENTINE).

The *sugar pine* is a large tree, often attaining a height of 250 feet and a diameter of 6 to 10 feet. It is found in the forests of Oregon, Washington and northern California. Its wood resembles that of the white pine, and the tree is a valuable source of lumber. Among other species are the *dwarf Mugho*, the *Italian stone*, the *cluster* and the *great-hooked*, or *Coulter's*, pines. See FORESTS; LUMBER.

Pine′apple, a tropical fruit which takes its name from its outward resemblance to a pine cone. The pineapple is a biennial. It has long pointed leaves, whose edges are in most species furnished with sharp spines. The leaves are thick and juicy. From the center of the cluster a stem rises two or three feet and bears on its upper end a flower cluster, in the form of a conical spike. Each flower is placed in the axil of a bract, except those near the top, which develop into a cluster of small leaves, which crowns the ripened fruit. The fruit is the thickened fleshy flower stalk, and in this respect, as well as in its odor and flavor, the pineapple somewhat resembles the strawberry.

PINEAPPLE

The pineapple is a native of South America and the West Indies, where the early Spanish explorer discovered it to be cultivated by the indians. It is highly prized and has been carried to the warm countries of Europe and Asia. In England it is raised in hot houses. Its successful culture requires a warm climate and abundant moisture. The fruit varies in size from two to twelve pounds. About fifty species are known. The fiber of the leaves is often woven into delicate and beautiful fabrics. That of the Philippines is called Pina muslin.

Northern Africa, the Azores, the Bahamas, West Indies, Florida and California supply the European and American markets. Large quantities are also raised in Queensland, Australia, and the Philippine Islands.

Pine Bluff, Ark., the county-seat of Jefferson co., 42 mi. s. by e. of Little Rock, on the Arkansas River and on the Saint Louis & Southwestern, the Saint Louis, Iron Mountain & Southern and other railroads. It is in a fertile cotton-growing region, has a large trade in cotton and lumber and contains railroad shops, cotton compresses, cottonseed oil mills, a foundry, iron works, a printing house, and furniture and other factories. It is the seat of a state normal college for colored students, and the state fair is held here annually. The city has a girls' industrial school, an opera house, a courthouse, several fraternal society buildings, and the Merrill Institute, with its gymnasium and free library. Population in 1900, 11,496.

Pinero, Arthur Wing, *pin ayr'o,* (1855–), a dramatist, born in London, of Jewish ancestry. He began the study of law, but soon entered upon a stage career. His first play was produced in 1876 and was fairly successful. After that time he continued to write and produce dramas, which were almost uniformly popular. Among his best known works are *Sweet Lavender* and *The Second Mrs. Tanqueray.*

Pines, Isle of, one of the West India Islands, situated 35 mi. s. of Cuba, to which it belongs politically. The area is about 900 square miles. The coast line is irregular, and the surface is interspersed with mountains and plains. The island is well watered and has a number of small rivers. The climate is mild and even, and the soil is well adapted to the growing of fruit and live stock. Tobacco is also raised, and pine, mahogany, cedar and other woods are produced. The island also contains a valuable marble quarry. Tar, turpentine and pitch are manufactured to some extent. Population in 1889, 3199, of whom a large part were emigrants from the United States, who control most of the industry of the island. The presence of these citizens of the United States led, in 1905 and 1906, to a serious agitation for annexation to the Union.

Pine Tree Shilling, the name given to the largest of several coins issued by the colony of Massachusetts in 1652. The others were sixpence and three-pence pieces. On one side was a rude engraving of a pine tree, encircled by the words *Masathusets In.* Upon the other was the expression *1652, XII,* encircled by the words *New England* and *An. Dom.* The weight was about seventy-two grains, and the value was about eighteen and one-fourth cents.

Ping Pong, a game modeled closely after lawn tennis, but played in the parlor on a table or board. The ball is a light hollow sphere of celluloid, and small rackets similar to tennis rackets are used. At one time ping pong was a very popular game, for almost any kind of table can be used by merely stretching a net across the middle of it. A single service only is allowed in ping pong, and in this respect it differs from lawn tennis, but the score is counted in the same manner as in the latter game.

Pin'gree, Hazen Senter (1842–1901), an American politician and manufacturer, born at Denmark, Maine. He learned the trade of a shoe cutter, but entered the Union army in 1862 and served during the war, being captured by Mosby and imprisoned at Andersonville for several months. He subsequently located in Detroit, and in 1866, with C. H. Smith, he started a small shoe factory, which has become one of the largest manufacturing establishments in the West. He was mayor of Detroit from 1889 to 1896 and was governor of Michigan from 1896 to 1900. Mr. Pingree was the leader in a number of municipal reforms in Detroit and was a strong advocate of municipal ownership of street railways. While governor he attempted to reform the methods of taxation.

Pink, a genus of flowers, most of the species of which are natives of Europe and parts of Asia. Many are cultivated in gardens, for their beauty and fragrance. One species, including carnations and clove pinks, grows wild in southern Europe. *The China,* or *Indian, pink* is another beautiful species and is widely cultivated. Besides these, there are the *common pink,* with fringed petals and rough-edged leaves, and the *sweet-william,* common in gardens.

Pink'erton, Allan (1819–1884), a detective, born in Scotland. He moved to Chicago in 1841 and was made deputy sheriff and a member of the detective department of the Chicago police in 1850. Later he organized a private detective force, which became famous for its thorough organization and remarkable achievements. He was head of the secret police of the Union army during the Civil War. Among the books which he published are *Criminal Reminiscences, The Gypsies and the Detectives, The Burglar's Fate, The Spy of the Rebellion* and *Thirty Years a*

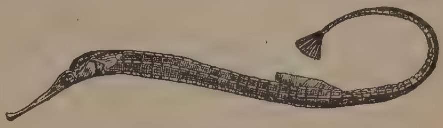
Detective. The organization of the Pinkerton detectives which he effected is still in existence.

Pinturicchio, *peen too re'ke o,* (1454–1513), an eminent Italian painter of the Umbrian school, whose real name was Bernardino di Betto, born at Perugia. He lived for a time at Rome, and while there he was engaged on the frescoes of the Sistine Chapel, in the Borgia apartments of the Vatican, in the Buffalini Chapel and in the Church of Saint Maria in Araceli, being at this time under the influence of Perugino. His chief work was a series of mural paintings illustrating the life of Pope Pius II, in the cathedral library at Siena. He left many exquisite altarpieces and other works in tempera, and he was considered the greatest decorative artist of his time.

Pipe, a tube for the conveyance of water, steam, gas or other fluid, used for a great variety of purposes in the arts and in domestic economy. The materials of which pipes are made are also various, wood, stone, earthenware, iron, lead, copper, leather and gutta-percha all being employed. Drainage and sewage pipes of great strength and size, measuring from one or two up to fifty-four inches in diameter, are usually made of fire clay and glazed on their outer and inner surfaces. Large iron pipes are usually cast, and are used for the supply of water and gas.

Pipe, TOBACCO, a bowl and connecting tube, made of baked clay, wood, stone or other material, and used in smoking tobacco. The chief processes in the manufacture of clay pipes are molding and baking. Finer and more expensive pipes are made of meerschaum, a somewhat plastic magnesian stone, of a soft, greasy feel (See MEERSCHAUM). Meerschaum pipe making is carried on to the greatest extent by the Germans, and Vienna may be said to be the center of the manufacture. Sometimes the bowl alone, which is frequently artistically carved, is of meerschaum, the stem being of wood, the best sorts of which are got from the young stems of the Mahaleb cherry, grown near Vienna, the mock orange of Hungary and the jessamine sticks of Turkey. The stem, whether of the same material as the bowl, or of wood, is usually provided with a mouthpiece of ivory, silver or amber, the last being preferred. Brier root pipes, with the bowl and stem of one piece of wood, and provided with amber, ivory or bone mouthpieces, are now very common. They are made of the roots of a large variety of heath. Many Germans prefer pipes with porcelain bowls, which are sometimes beautifully painted in the style of fine chinaware painting. The Eastern *hookah* is a pipe of great size, the bowl of which is set upon an air-tight vessel, partially filled with water; it has a small tube which passes down into the water. The long flexible smoking-tube is inserted in the side of the vessel, and the smoke is made to pass through the water, being thus cooled and deprived of some noxious properties. In America, pipes have been in use from a very remote period. Indian pipes, with elaborately carved soapstone bowls and ornamented wooden stems, or made entirely of baked clay, have been found in the ancient mounds of the West, together with other relics of an unknown race. See CALUMET.

Pipefish, a genus of fishes, included in, and nearly allied to, the curious little animals popularly known as sea horses. The pipefish is distinguished by a long and tapering body and by its peculiar jaws, which are united to form a tube, or pipe, bearing the mouth at the tip. The largest of the pipefishes is said to attain a length of three feet. A very remarkable fact is that the males of some species possess a pouch-like fold at the base of the tail, in which the young, after hatching, continue to live for a time. Some species are protected by their close resemblance to the blades of eelgrass, among which they abound. See color plate, FISHES.



PIPEFISH

Pip'it or **Tit'lark,** a genus of singing birds, which show a close relationship to the larks and wagtails. All pipits are mainly brown, with dark streaks on the body and light-edged feathers. Their songs are in some cases agreeable; in others, they are too shrill to be pleasant. They live principally on the ground, over which they run swiftly. There are several species to be

PIPIT

found throughout Europe, and in the United States one is familiar during the migrations. The "Missouri skylark," which takes its name from its habit of singing while soaring in the air, is a near relative.

Pip′pin. See PEPIN.

Piqua, *pik′wa,* OHIO, a city in Miami co., 70 mi. s. w. of Columbus, on the Miami River, on the Miami & Erie Canal and on the Cincinnati, Hamilton & Dayton, the Pittsburg, Cincinnati, Chicago & Saint Louis and several electric railways. It is in a rich farming region, has good water power and contains linseed oil, strawboard and woolen mills, a furniture factory, iron works and other manufactories. The city has a high school and the Schmidlapp Library, and it owns and operates the waterworks. Population in 1900, 12,172.

Piquet, *pe ket′,* or, in England, **Picket,** one of the oldest card games now played. It is played by two persons, who use all the cards except the twos, threes, fours and fives. Twelve cards are dealt, two or three at a time to each player, and the cards remaining are placed on the table within easy reach. If no face card is dealt to either player, he scores ten at once, after spreading the cards on the table for his opponent to see. Then the players discard. The one at the left of the dealer must discard one and may discard five cards and take in place of them an equal number from those that have not been dealt. If he discard less than five, he may look at the first five of the stock and make his selection. The dealer discards or not, as he chooses, but he may take all that the other has left, discarding an equal number from his hand. Differences exist among the authorities concerning the rules for discarding. The players score according to certain combinations of cards, which may be learned from any good book on games. Piquet is not played to any great extent in the United States.

Pi′racy, the offense which consists in committing those acts of robbery and depredation upon the high seas, or other places where the admiralty has jurisdiction, which, if committed upon land, would amount to felony only. This offense is punished with death in the United States. Piracy, in the common sense of the word, is distinguished from privateering by the circumstance that the pirate sails without any commission and under no national flag, while the privateer acts under a commission from a belligerent power.

Piraeus, *pi re′us,* the principal port of both ancient and modern Athens, situated 5 mi. s. w. of that city, on a peninsula. It has three harbors, two on the east side and one, the largest of the three, on the west side. Over one half of the foreign trade of Greece passes through Piraeus, which has also manufactures of some importance, including textiles, macaroni, leather and distilled liquors. Piraeus was anciently connected with Athens by walls known as the Long Walls. When Greece was freed from Turkish rule, Piraeus was largely in ruins. Since then a flourishing city has grown up. Population, 42,169.

Pisa, *pe′za,* a town of northern Italy, capital of the Province of Pisa, 5 mi. from the Mediterranean and 49 mi. w. of Florence, on both banks of the Arno, which is here crossed by three stone bridges for general traffic and one railway bridge. The city is surrounded by walls and ditches and is defended by a citadel, the fortified circuit having a length of nearly six miles, much of the space enclosed being unoccupied. The river is lined by handsome quays on both sides; the streets are spacious and well paved, and the houses are remarkable for the profusion with which marble has been employed in their construction. In the northwest part of the city is the famous Piazza del Duomo, which contains a remarkable group of buildings, consisting of the magnificent cathedral, which dates from the eleventh century; the baptistry; the Campo Santo, or cemetery, and the famous Leaning Tower (See PISA, LEANING TOWER OF). The city has also a number of notable palaces, an Academy of Fine Arts and a university, which is one of the oldest in Europe. The manufactures of Pisa consist chiefly of silk, woolen and cotton goods. The population, which reached 150,000 when the city was at the height of its power, was in 1901 only 28,046.

Pisa, COUNCIL OF, a general council of the Roman Catholic Church, held to consider the pretensions of the rival popes of Avignon and of Rome, opened March 25, 1409. The rival popes, Benedict XIII (of Avignon) and Gregory XII (of Rome), were summoned to appear within a stated period, but refused to comply. After mature deliberation both popes were formally deposed, and Cardinal Pietro Philargi, archbishop of Milan, was elected. The authority of the council was not, however, generally recognized, and it was not until 1417 that the schism can be said to have terminated.

Pisa, LEANING TOWER OF, the famous campanile of Pisa, which overhangs its base on one side. Its height is 179 feet, and its obliquity, 13 feet. It was begun in the twelfth century and was completed in 1350. There has been considerable discussion as to whether the slant was accidental or intentional, but it is now generally believed that it was intentional.

Pisces, *pis'seez,* (the fishes), the twelfth sign of the zodiac, into which the sun enters about Feb. 19. The constellation contains some interesting double stars. The symbol of Pisces is ♓.

Pis'cicul'ture. See Fish Culture.

Pisis'tratus (612–527 B. C.), a tyrant of Athens. By putting himself forward as the patron and benefactor of the poor and by advocating civil equality and a democratic constitution, he was able to seize upon the Acropolis in 560 B. C., and thus to make himself master, or, as the Greeks termed it, tyrant, of the city. But though a tyrant in the Greek sense, his use of power was by no means tyrannical. He made no attempt to abolish the wise laws of Solon, but confirmed and extended their authority. He was, however, twice driven from Athens; but in the eleventh year of his second banishment he succeeded in making himself master of the sovereignty for the third time. Pisistratus erected splendid public buildings at Athens, established a public library, collected and arranged the poems of Homer, and conducted himself with so much prudence and clemency that his country scarcely ever enjoyed a term of greater peace and prosperity.

Pis'til. See Flowers.

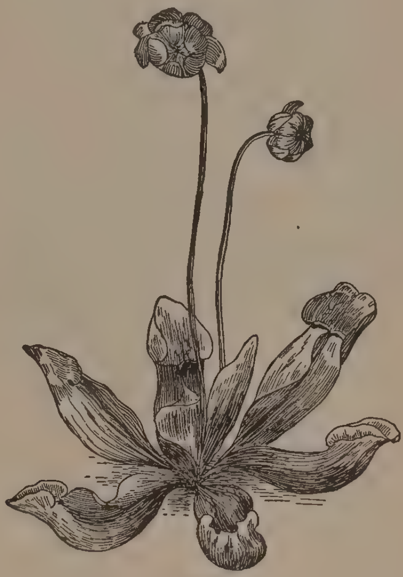
Pis'tol, a small firearm, discharged with one hand, named from the town of Pistoja, where pistols were first made. Pistols were introduced into England in 1521. Mention is made of their use in 1544. Pistols are made of various sizes, ranging from six to eighteen and even twenty-four inches in length. The modern revolver has replaced the pistol in use.

Pit'cairn, John (about 1740–1775), a British soldier, born in Fifeshire, Scotland. He entered the army in 1765, became a major in 1771 and was stationed at Boston under General Gage. In the spring of 1775 he commanded the British expedition to Lexington and Concord and, it is believed, fired the first shot at the Battle of Lexington. He was mortally wounded in the last charge at Bunker Hill.

Pitcairn Island, an island in the South Pacific, belonging to the Low Archipelago. Its length is about two miles, its width one mile. Its coast is almost perpendicular throughout its whole extent and is fringed with formidable rocks and reefs, accessible at only two points. The soil, naturally fertile, yields potatoes, cocoanuts, breadfruit, yams, pineapples and other tropical products. The island is chiefly remarkable as the home of the descendants of the "Bounty" mutineers, nine of whom, together with six men and twelve women, natives of Tahiti, landed here in 1790. Violent dissensions soon arose, and at the end of ten years the only survivors were John Adams, an Englishman, eight or nine women and a number of children. Adams succeeded, however, in establishing a well-ordered community. They were found in 1808 by an American sealing ship, and the discovery was reported to the British government. The inhabitants were removed in 1856 to Norfolk Island, but some of them soon returned. The inhabitants number about 115 men and 96 women.

Pitch. See Tar.

Pitcher Plants, plants so named because their leaves are shaped like pitchers. These pitchers generally have honey-secreting glands, which attract insects, and hairs or bristles projecting downwards, which permit insects to crawl down into the pitcher but prevent their escape. The dead insects serve as food to the plant. One well-known American species is the *sarracenia,* found in the swamps east of the Rocky Mountains, especially east of the Mississippi River.



SARRACENIA

Pit'man, Isaac, Sir (1813–1897), the inventor of the Pitman system of shorthand, born in Trowbridge, Eng., and educated at London. He taught school for several years, but in 1837, upon the publication of his *Stenographic Sound-hand*, he began to devote himself entirely to the promotion of shorthand study. In 1842 he established a phonographic journal, a weekly, afterwards called the *Phonetic Journal*, and he continued to edit this paper for more than fifty years. He was an ardent advocate of spelling reform and was instrumental in introducing postage stamps into England. He was knighted in 1894 for his service in the promotion of shorthand writing. See SHORTHAND.

Pitt, WILLIAM, First Earl of Chatham (1708–1778), one of the most illustrious statesmen of Great Britain. He was educated at Eton and Oxford, entered Parliament in 1735 and soon attracted notice as a powerful opponent of Walpole. In spite of the king's dislike, Pitt was powerful enough to win a place in the administration, first as vice-treasurer of Ireland and afterward as paymaster-general. In 1756 he became secretary of state and the real head of the government. He was dismissed in 1757, on account of his opposition to the king's policy, but no stable administration could be formed without him, and he returned to power the same year in conjunction with the duke of Newcastle. It was under this administration and entirely under the inspiration of Pitt that Britain rose to a place among the nations which she had not before occupied. Wolfe and Clive, stimulated and supported in their great designs by Pitt, won Canada and India from the French, and the support Pitt gave Frederick of Prussia contributed not a little to the destruction of French predominance in Europe.

WILLIAM PITT

The accession of George III brought Lord Bute into power, and Pitt, disagreeing with Bute, resigned in 1761. In 1766 he strongly advocated conciliatory measures toward the American colonies and undertook to form an administration, in the same year entering the House of Lords as earl of Chatham. But his ministry was not successful, and in 1768 he resigned. After this, his principal work was his appeals for a conciliatory policy toward the colonies. He received a public funeral and a magnificent monument in Westminster Abbey.

Pitt, WILLIAM (1759–1806), an English statesman, the second son of William Pitt, first earl of Chatham. He was educated at Cambridge, was called to the bar in 1780 and entered Parliament the following year. In 1782 he became chancellor of the exchequer under the earl of Shelbourne, and in the following year he attained the position of prime minister, although he was only twenty-four years old. His first measure was the passing of his India bill, establishing the board of control, which was followed by much of that fiscal and financial regulation that made the early period of his administration famous. The establishment of a sinking fund followed in 1786, and his Regency bill was passed in 1788.

The French Revolution then broke out, and in 1793 war arose between Great Britain and France, a conflict which brought a heavy responsibility on Pitt, as well as immense sacrifices and burdens on his country. In 1800 the Irish union was accomplished, but in the following year the opposition of the king to all concession to the Irish Catholics caused Pitt to resign his post. When war again broke out with France, Pitt returned to power and exerted all his energy to render the contest successful. He found means to engage the great military powers of Russia and Austria in a new coalition, which was dissolved by the Battle of Austerlitz. This event he did not survive long. Biographers differ as to his merits as a statesman; some assign him a most exalted place, while others represent him as entirely destitute of great ideas, as a man of expedients instead of principles, as a lover of place and royal favor.

Pit'ti Palace, of Florence, Italy, now a royal residence, one of the most imposing palaces in the world. It was designed in 1440 by Brunelleschi for the Pitti family. A large portion of it is used as a picture gallery, which contains one of the most important collections of paintings in the world. Many of the most important Florentine and other masters are represented here, such as Andrea del Sarto, Raphael, Salvatore Rosa and Titian.

Pitts'burg, Kan., a city in Crawford co., 130 mi. s. of Kansas City, on the Atchison, Topeka & Santa Fé, the Missouri Pacific, the Frisco and the Kansas City Southern railroads. It is in a rich agricultural region, near valuable coal fields and the mineral deposits of southwestern Missouri. There are large zinc-smelting works, railroad shops, a foundry, machine shops, large brick and sewer pipe works, lumber and flour mills, grain elevators, an ice factory and other establishments. The state Auxiliary Manual Training Normal School, a branch of the state normal school, is located here, and the city has a public library, a large opera house, thirteen churches, two hospitals, four hotels and two national banks. The municipality has paved streets, waterworks, gas and electric lights, electric street railways and suburban electric railroads to the mining camps. The place was settled in 1876, was incorporated in the same year and was chartered as a city of the second class four years later. It became a city of the first class in 1905. Population in 1905, 15,012.

Pittsburg, Pa., the county-seat of Allegheny co., and the second city of the state, situated at the confluence of the Allegheny and Monongahela rivers, 354 mi. w. of Philadelphia, 430 mi. s. w. of New York and 468 mi. s. e. of Chicago, on the Pennsylvania, the Baltimore & Ohio, the Wabash and numerous other railroads. The oldest portion of the city is built on a flat, triangular tongue of land between the two rivers, but this land rises rapidly toward the east, where eminences attaining a height of 400 and 500 feet are found. Several industrial suburbs on the south bank of the Monongahela also constitute a part of the city, together with Allegheny City, across the Allegheny River to the north, formerly a separate municipality, though always industrially and socially closely related to Pittsburg (See Allegheny). In the older part of the town the streets follow the directions of the rivers and consequently tend to converge; but in the eastern and residential sections the city is more regularly laid out. Here the streets are broad and well shaded, and they cross each other in most instances at right angles.

About three miles east of the industrial center is Schenley Park, in the midst of the residential section, with an area of 440 acres. Within the park are the Phipps Conservatory, the Hall of Botany, Music Pavilion and a number of statues. Highland Park, situated on the Allegheny in the northeastern portion of the city, is of about the same area and is noted for its picturesque scenery, for its zoölogical gardens and for the large city reservoirs. There are also a number of other small parks. Schenley and Highland parks and the business district are connected by Grant and Beechwood boulevards.

Among the prominent buildings are the Allegheny courthouse, one of the finest structures of its kind in the Union; the postoffice; the Frick Building, a granite structure 20 stories high; the Farmers' Deposit National Bank, the Carnegie, the Park, the Tradesmen's and the People's Bank buildings. Among the churches worthy of mention are the Saint Paul's Cathedral; the First and the Third Presbyterian churches; Trinity Methodist, Saint Augustine, and Calvary. Of the public institutions the Carnegie Free Library and the Carnegie Institute are the most noted. The charitable institutions include fourteen hospitals, a newsboys' home, a home for working girls, asylums for the deaf and dumb and blind and numerous other institutions, which together cover a wide range of interests. The chief educational institutions are the Western University of Pennsylvania, the Pennsylvania College for Women, the Pittsburg Female College, the Pittsburg College of the Holy Ghost, the Carnegie Institute, which contains one of the largest museums in the country, and Carnegie Technical School, a great institution for industrial training. The public library has over 200,000 volumes. In addition to this there are the library of the Western Theological Seminary and the libraries of Western University and other educational institutions.

Located in the iron, coal, petroleum and natural gas regions and within favorable distance of all the leading cities of the Atlantic seaboard and the interior of the country, Pittsburg has become one of the largest industrial centers in the United States. To-day Greater Pittsburg contains immense industrial capital. It manufactures more than half of the structural iron and steel, one-fourth of the pig iron, two fifths of the steel and nearly two-thirds of the coke of the country; it makes more steel rails for railroads and more armor plate for battleships than any other city in America. The largest steel car plant and the largest single group of blast furnaces in the world are within her limits. The forty-one great blast furnaces, as producers of iron, give Pittsburg the world-famed title, "The Iron City." Almost every known form of glass is made in the city, and it is the largest center for the manufacture of glass in the United States, as well as the greatest plate glass center of the world. Many of the most important inventions in glass making have originated in Pittsburg. In addition to the industries above named, there are extensive manufactures of airbrakes, locomotives, engines, machinery, foundry and machine shop products, slate, brick, pottery, leather, paper and lumber. Pittsburg is the third largest lumber market in the United States, with only New York and Chicago superior. More electrical machinery is built in this city than in any other community in the world, and ten thousand persons are employed in that industry alone. The largest works of the United States Steel Corporation are located in and about the city.

The old town was built on the site of Fort Duquesne, erected by the French in 1754. Against this fort Braddock directed his ill-fated expedition in 1755, making his brave, but foolhardy, fight against an invincible and almost invisible foe. Three years later the fort was captured by the British; a new fort was erected and named Fort Pitt, in honor of William Pitt, prime minister of England. The first permanent settlement was made in 1765. From that time it has rapidly increased in population and importance. It became the county-seat in 1791 and was chartered as a city in 1816. Population of Pittsburg in 1900, 321,616. Estimated population of Greater Pittsburg, 600,000.

Pittsburg Landing, BATTLE OF. See SHILOH, BATTLE OF.

Pitts'field, MASS., the county-seat of Berkshire co., 50 mi. n. w. of Springfield, on the Boston & Albany and the New York, New Haven & Hartford railroads. The city has a beautiful location among the Berkshire Hills, at an elevation of over 1000 feet, near several picturesque lakes. It is an attractive residence place and a popular summer resort. The principal structures include the Berkshire Athenaeum, containing a large public library and the rooms of the Berkshire Historical Society; the Crane Art Museum; the courthouse, built of white marble, and the buildings of the Berkshire Life Insurance Company and the Berkshire County Savings Bank. The city also has a high school, Saint Joseph's Academy, House of Mercy Hospital, a training school for nurses, a home for aged women and three public parks. The Agassiz Association has its headquarters here. There are cotton, woolen and silk mills, the large plant of the Stanley Electric Manufacturing Company, a branch of the General Electric Company, foundry and machine shops, paper mills and manufactures of shoes, electrical supplies and numerous other articles. The place was settled as Boston Plantation in 1743, was incorporated under its present name in 1761 and was chartered as a city in 1891. Population in 1905, 25,001.

Pitts'ton, PA., a city in Luzerne co., 10 mi. s. w. of Scranton, on the Susquehanna River and on the Lehigh Valley, the Erie, the Lackawanna and other railroads. It is in an anthracite region, and coal mining is the principal industry. Fire clay is found in the vicinity, and there are foundries, machine shops, stove and engine works, breweries, brick and terra cotta plants and knitting, flour, paper, lumber and other mills. Pittston is chiefly a commercial and industrial city, while West Pittston, on the opposite side of the river, is more distinctly a residence place. Pittston was laid out and named in honor of William Pitt in 1770 and was chartered as a city in 1894. Population in 1900, 12,556.

Pi'us, the name of ten popes, the most important of whom are the following:

PIUS II (1405–1464), Aeneas Sylvius Piccolomini, was pope from 1458 to 1464. He studied at Siena, subsequently became secretary to Cardinal Capronica and later to Antipope Felix V. Having been sent on an embassy to Emperor Frederic III, he was persuaded to accept office in the imperial court and was made ambassador, successively, to the courts of Milan, Naples and Rome. Calixtus III raised him to the cardinalate. As pope, he founded a military order of knights to defend the isles of the Aegean Sea against the Turks. But he was best known for his literary works, the most interesting of which are his letters. He was one of the most eminent scholars of his age.

PIUS V (1504–1572) was pope from 1566 to 1572. His chief service as pope was to enforce the reform decrees of the Council of Trent. With Spain and France, he organized the Holy League against the Turks, which resulted in the naval battle in the Gulf of Lepanto, October 7, 1571.

PIUS X

Pius VI (1717–1799), Giovanni Angelo Braschi, held important offices under several pontiffs, was raised to the cardinalate by Clement XIV and succeeded him as pope in 1775. To this pope Rome is indebted for the draining of the Pontine marshes, the completion of the Church of Saint Peter, the improvement of the port of Ancona and other similar works.

Pius VII (1742–1823), Gregorio Barnaba Chiaramonti, was created bishop of Tivoli by Pius VI and, after being made cardinal was transferred to the bishopric of Imola. His friendly attitude toward the Cisalpine Republic secured him the favor of France and the election to the papal chair in 1800. After his accession he aimed at reëstablishing the old order of things, and to gain it he tried to conciliate Napoleon by attending his coronation. He aroused the open enmity of the emperor by refusing to be present at the coronation in Milan and by declining to recognize Joseph Bonaparte as king of Naples. The result was another occupation of Rome by French troops, the incorporation of the papal cities and, shortly after, of Rome itself, with the kingdom of Italy, and the removal of the pope to Florence, then to Grenoble, to Savona and afterward to Fontainebleau. In 1814 he was released and restored to the possession of all the papal territories except those of Avignon and Venaissin in France and a narrow strip of land beyond the Po.

Pius IX (1792–1878), Giovanni Maria Mastai-Feretti, held various ecclesiastical offices under Leo XII, who appointed him archbishop of Spoleto in 1827 and to the see of Imola in 1832. Although raised to the cardinalate in 1840, he resided in his diocese until his election to the pontificate in 1846. His accession was signalized by the release of 2000 political prisoners, followed by a complete amnesty and by the announcement that Italy was to be free and independent, under a liberal constitution. During trouble with the Austrians, the pope was compelled to leave Rome. A Roman Republic was proclaimed in 1849, with Mazzini at its head. Louis Napoleon, president of the French Republic, sent an expedition to Rome, which defeated the Italian patriots under Garibaldi and occupied the city. The pope returned in April, 1850, but he left the direction of State affairs principally in the hands of his secretary of state, Cardinal Antonelli. See Pius X.

Pius X (1835–), Guiseppe Sarto, the successor of Pope Leo XIII, born at Riese, Italy, in the Venetian province of Treviso. He was sent from the village school to the college at Castel Franco, then to the central seminary at Padua, where he graduated with much distinction. He was ordained priest in the Cathedral of Castel Franco on Sept. 18, 1858. His first cure was in the parish of Tombolo, from which, in 1867, he was transferred to Salzano and was made parish priest. Eight years later the Bishop of Treviso, recognizing his piety and ability, appointed him not only canon of the cathedral of Treviso and chancellor of the diocese, but the spiritual director of the college. Soon he was made dean of the chapter, and after serving during an interregnum as vicar-general, he was appointed suffragan by the new bishop. He next became bishop of Mantua. In 1893 Leo XIII made him a cardinal and almost immediately afterward created him patriarch of Venice. In 1894 there was considerable anti-clerical agitation going on in Venice. But the new bishop was not long in making himself beloved by all in his patriarchate. He took a deep interest in social questions and threw himself heart and soul into all enterprises for the bettering of the lot of the poor, lending his aid to the institution of rural banks, coöperative societies and benevolent associations. On August 4, 1903, he was elected pope and was crowned in Saint Peter's Cathedral at Rome, Aug. 9.

The new pope is known for his sincerity, his generosity and his sympathy with the people. In breadth of education he is one of the most respected members of the Sacred College. He lives simply, almost frugally, and his manner is characterized by a charming and genuine courtesy. Among the few books from his pen is a *Manual of Politeness,* which he wrote for the benefit of his clergy. He is an eloquent and convincing speaker, a skilled musician and a connoisseur in art. As a worker he belongs to the strenuous type and is known among the clergy as a rigid disciplinarian. Although not a politician, according to the ordinary meaning of that word, he has good common sense and has on various occasions proved that he possesses executive ability in a marked degree. Yet the basis of his character is a simple and earnest piety.

Pizarro, *pe zahr'ro,* Francisco (1471–1541), a Spanish adventurer, the discoverer and conqueror of Peru. The spirit of adventure, which in his time pervaded Spain, prompted him to seek fortune in the newly-found continent of America, where he participated in various military and trading expeditions. While resident near Panama, he became associated with two other adventurers, Hernando Lugue, or De Lugues, and Diego de Almagro. In 1524 they jointly fitted out an expedition, with a view to exploration and conquest, and on their second voyage they discovered Peru; but finding their force inadequate for conquering the country, Pizarro returned to Spain for assistance. He arrived in Seville in 1528, was granted the necessary powers and a small force and re-crossed the Atlantic in 1531. The following year he arrived in Peru during a civil war, treacherously seized the person of the reigning inca at a friendly banquet and, after extorting an immense ransom, put him to death. The whole empire was gradulaly conquered without much opposition, but its settlement was long in abeyance, owing to a feud between Pizarro and Almagro. Hernando Pizarro, a brother of the general, strangled Almagro in 1537. This act was avenged when a son of Almagro murdered Francisco Pizarro in his palace at Lima. Lima was founded by Pizarro in 1535, and there his remains are interred in the cathedral, also founded by him. See ATAHUALPA; INCA.

Plague, *playg,* a contagious fever, which brings great prostration, stupor, delirium and, in a large proportion of cases, death. It is caused by a bacillus which has been recognized and found growing in rats and other small animals, and these doubtless carry the infection from house to house (See GERM THEORY OF DISEASE). The plague attacks suddenly and is sometimes fatal within a few hours, but usually it runs its course in three days. If the patient lives until the fifth day, he will probably recover. As characteristic of the disease, livid spots and large carbuncles sometimes appear on the skin and give to the disease the name of *bubonic plague.* There is no specific remedy, though a great variety of treatments have been adopted on different occasions by different medical men. Prevention by proper sanitary measures is the greatest safeguard. The plague appeared in most ancient times, although historians have used the term indiscriminately for other epidemics. The first recorded visitation of the plague to Europe is that at Athens (430 B. C.), described by Thucydides; Josephus records that of Jerusalem, in 72 A. D. Among the most disastrous plagues of antiquity are those of Rome in 262, when 5,000 persons are said to have died daily, and Constantinople, in 544. From the latter part of the sixth to the twelfth century it ravaged, at intervals, various parts of Europe, particularly France and Germany. In the thirteenth century it was brought to modern Europe by the Crusaders, and from 1347 to 1350 it traversed all Europe and was then called the *black death.* The scourge again claimed its victims in the succeeding centuries, and in 1593 it was brought to England by an army returning from the Continent. London lost by the plague 36,269 lives in 1603; 35,500 in 1625; 13,480 in 1636, and 68,600 in 1665. The plague in Marseilles in 1720 caused the death of over 60,000 in seven months. In 1771 it swept off nearly the whole population of Moscow. In November, 1899, the plague appeared in New York City, and in the next year other cases were reported there and in San Francisco, but there was no extensive spread of the disease in any place. In the same year in the Philippine Islands a number of lives were lost. Physicians feel that the disease can be controlled if the public authorities will take sufficiently active measures.

Plain, a broad expanse of country, with a level or slightly undulating surface and a low elevation. The term should not be applied to areas over a thousand feet in altitude. Plains gradually rise from sea level, on the coasts, to plateaus, in the interior, and in many instances the gradation is so gradual that there is no line of separation between the plain and the plateau. This is seen in the western portion of the great plains of the United States, which rise to an altitude of 2000 feet, in forming the plateau upon which the Rocky Mountains rise.

Plains are formed by the sea, by lakes, by rivers, by ice and by denudation. Those formed by the sea and lakes constitute a good portion of the earth's surface. The most extensive plain formed by the sea is that of Eurasia, which includes most of Siberia and a large part of Russia in Europe. Next to this in size is the Great Central Plain of North America, extending from the Arctic Ocean to the Gulf of Mexico and from the Appalachians to the Rocky Mountains. The Eurasian plain has its greatest extent from east to west and is located on one side of the continent, while the North American plain has its greatest extent from north to south and is located in the interior of the continent. Both are ancient beds of the sea, and their level surface is due largely to the fact that it is formed by the deposit of sediment in standing water. The interior of northern Africa is a great plain and was also formed by the sea. A portion of this constitutes the Sahara. The most noted illustration of plains formed by a lake is that found in the valley of the Red River of the North. This extends from the northern boundary of South Dakota northward as far as Winnipeg. At its beginning it has a breadth of only a few miles, but before it reaches the northern boundary of the United States, this has been extended to a width of over 200 miles, and the area continues to increase until the plain blends with the great plain of the western part of Manitoba. River plains are found along the lower course and at the mouths of rivers (See FLOOD PLAIN; DELTA). Plains by denudation are caused by the action of wind and weather. See EROSION.

Most plains contain soil of a high degree of fertility, and when located in suitable climates they produce abundant crops. For these reasons such plains have in all ages been the most densely populated regions. The plains of the Nile, the Ganges and the Po, in the Old World, and the Great Central Plain of North America, in the New World, are good illustrations of the economic value of these features of the earth's surface. See PLATEAU; LLANOS; PAMPAS; SELVAS; STEPPES.

Plain'field, N. J., a city in Union co., 24 mi. w. by s. of New York City, on the Central of New Jersey railroad. It is chiefly a residence city, picturesquely located at the base of the steep, wooded ridge known as First Mountain. It has public parks and contains the Muhlenberg Hospital and a public library. There are also manufactures of printing presses, tools, silk and cotton goods, carpets, gloves, clothing and other articles. The place was settled in 1684 and was chartered as a citv in 1869. Population in 1905, 18,468.

PLANE

Plane, a carpenter's tool, consisting of a smooth, solid block, through which a piece of steel shaped like a chisel passes obliquely. The plane is used for smoothing lumber. The chisel is usually set in an iron block, to which a handle is attached. The thickness of the shaving is regulated by the projection of the chisel below the lower surface of the block. When the plane is moved forward, the shaving is cut from the surface of the wood. The chisel is adjusted by a screw with a fine thread, so that a very nice adjustment can be made.

The chisel should be kept sharp, and except for use on rough surfaces its adjustment should be such as to take only a thin shaving. The plane should be held firmly in the right hand and the left hand should be placed upon the forward end of the block, which usually has a small knob for this purpose. Before using the plane, one should determine in which direction the grain of the wood runs and should always move the tool over the wood in this direction; otherwise a smooth surface cannot be obtained. The *jointer* is a plane with a long block and is used for producing a straight edge. The block plane has a short block and a very fine adjustment and is used for securing a very smooth surface.

Plane, in geometry, a surface, such that if any two points in it be joined by a straight line, that line will lie wholly within the surface. If two planes intersect, the line of intersection is a straight line. A plane is determined by three points not in a straight line, by two intersecting straight lines, by a straight line and a point outside of it or by two parallel lines. A plane figure is a portion of a plane bounded by lines, either straight or curved; in the former case the figure is rectilinear; in the latter case it is curvilinear. See MATHEMATICS; GEOMETRY; SQUARE; CIRCLE; TRIANGLE; POLYGON; ELLIPSE.

Plan'et, a celestial body which revolves about the sun as its center, or a body revolving about another planet as its center. The best known *major planets* are, in order of their proximity to the sun, Mercury, Venus, the Earth, Mars, Jupiter, Saturn, Uranus and Neptune. Mercury, Venus, Mars, Jupiter and Saturn were known to the ancients. Uranus was accidentally discovered by Herschel in 1781, while the discovery of Neptune was the result of pure intellectual work, the calculating of Leverrier and Adams. The planetoids, or asteroids, are small bodies between the orbits of Mars and Jupiter, discovered since the beginning of the present century. The number of these asteroids that are known is annually increased; nearly 300 have been discovered. Mercury, Venus, the Earth and Mars closely resemble each other in many respects. They are all of moderate size, with great densities; the earth weighs five and a half times as much as an equal bulk of water. They shine only by reflected sunlight. Jupiter, Saturn, Uranus and Neptune, on the other hand, are of enormous size, are of small densities, some of them weighing less than an equal bulk of water, and probably exist at a high temperature, and give out, in addition to reflected sunlight, a considerable amount of light and heat of their own. The most colossal of the planets is Jupiter; its volume is about 1200 times as great as that of the Earth. Saturn is next in size. Mars, Jupiter, Saturn, Uranus and Neptune, being outside the Earth's orbit, are sometimes called the *superior planets*; Venus and Mercury, being within the Earth's orbit, are called *inferior planets.* The family of major planets has also been subdivided into *intra-asteroidal* planets—Mercury, Venus, the Earth and Mars; and *extra-asteroidal* planets—Jupiter, Saturn, Uranus and Neptune, the character of the two being very different, as above described. The planet which approaches nearest to the Earth is Venus, the least distance in round numbers being 23,000,000 miles; the most distant is Neptune, whose least distance is 2,629,000,000 miles.

The following table gives the names of the planets; also, in column I, their distances from the sun, as compared with the earth's distance; in column II, their size as compared with the size of the Earth, and in column III, their periods of revolution around the sun.

	I	II	III
Superior Planets:			
Mars	1.5	15	687 days
Jupiter	5.2	1164.	11.9 years
Saturn	9.5	783.	29.5 years
Urnaus	19.2	66.	84. years
Neptune	30.0	86.	164.8 years
Earth	1.	1.	365¼ days
Inferior Planets:			
Mercury	.4	.05	88 days
Venus	.7	.88	224.7 days

To us, the planets sometimes appear to move from west to east, and sometimes they appear stationary. These curious motions puzzled the ancient astronomers, who named these bodies *planets*, or *wanderers.* All their motions, however, became intelligible when the theory of the solar system was advanced (See SOLAR SYSTEM). Neptune, the asteroids and all the satellites except the moon are invisible to the naked eye. Uranus may occasionally be seen. Under an opera glass the moons of Jupiter may sometimes be distinguished. It is easy to recognize the other planets, because they shine with a clear, steady light and do not twinkle as the fixed stars do. See article upon each planet for a description, and see NEBULAR HYPOTHESIS, for origin of the planets.

Plan'etoid, one of many small planets which revolve about the sun between the orbits of Mars and Jupiter. They are about 270 in number, though others are being discovered from time to time. Ceres, the first known, was discovered in 1801. See ASTEROIDS.

Plane Tree, the name given to a genus of trees, of which several species are common in America. The *American plane tree,* or *buttonwood,* abounds in American forests, and in favorable locations it becomes the greatest of the deciduous trees of the United States. It often reaches a height of more than one hundred feet and has a diameter of from ten to fifteen feet. The gray or whitish bark flakes from the trunk. The leaves are large and spreading, and the fruit is a compact ball that hangs prettily from the branches. *Buttonball* and *sycamore* are other common names, but the latter is quite incorrect. The wood in seasoning becomes a dull red color, is fine grained and takes a good polish, but is not durable. There are only six species of the plane tree known, and all but one are American.

Pla'ning Machine, a machine tool for planing wood or metal. For the former purpose, the usual form has a series of cutters on a drum, rotating on a horizontal axis. The board to be planed is made to travel underneath. The cutter drum may be repeated underneath and at the edges, so as to plane all sides at once. In the planing of metals, the object to be planed is fixed on a table that moves forward and backward. At each forward movement the object is brought against a stationary chisel, which removes a narrow strip.

Plant, the general name given to all members of the vegetable kingdom. Scientists believe that all plants have been developed in a natural way from simple cells. The algae are believed to be the oldest plants, the great parent group from which the liverworts arise directly and from which the fungi have degenerated. From the liverworts were developed the mosses, which it is thought have given rise to the ferns, and they in turn have doubtless developed flowering plants; but just what species of ferns have developed into what species of seed plants is not known positively. Many plants are highly developed and have organs especially adapted to accomplish their purposes. For instance, there are roots, to absorb water and food; stems, to support the plant and carry the sap from root to leaves; leaves, to give off oxygen and carbon dioxide and to absorb such matters as are needed in the manufacture of tissue. There are, however, plants so simple in organization that all these processes are carried on in a single cell.

Plants show as great a variety in their ways of living as in their shapes. Some live independently, while others derive their food wholly or in part from some other plant or some animal. These parasites are not confined to the lower orders of plant life, but are sometimes found as degenerate forms of the highest. Mistletoe and dodder are examples of the latter class. Many species are armed with defensive or protective organs, such as flinty bark, cutting edges, thorns or stinging hairs; others are fitted to capture, hold and even digest insects. Harmless plants sometimes mimic the appearance of dangerous species or are colored so as to be almost indistinguishable from the pebbles or earth upon which they live. More surprising still is the storing of poisons or disagreeable matter in a plant, making it unpleasant for animals to eat; or, the growth of means for retaining a bodyguard of ants, which keep plants free from lice and other disturbing insects. The arrangements by which flowers secure cross-fertilization through the agency of insects are among the greatest marvels in nature (See POLLEN).

Plants grow by seeds or by roots and rootstocks, and the methods by which the seeds are scattered are nothing short of marvelous. Some are distributed by means of the wind, the thread-like plumes of the milkweed and dandelion being examples of organs that aid in that way. Some plants break off bodily from the ground and go tumbling over the land. Other fruits are armed with hooks or barbed prickles, by which they attach themselves to wandering animals, and still other fruits are covered by pulpy growths attractive to birds, who aid in the distribution of the hard seeds. The number of seeds produced is in many plants entirely out of proportion to the number that survive. A single orchid has been known to produce 10,000,000 seeds. Some plants have become so highly developed that they are able to adapt themselves to almost all conditions and are known to us as weeds.

For a classification of plants see BOTANY, and for the parts and organs see such titles as FLOWERS; FRUITS; LEAVES; SEEDS; STEMS.

Plant, MORTON F. (1852–   ), an American capitalist and promoter, born at New Haven, Conn., a son of Henry B. Plant, founder of the Southern Express Company. In 1868 he entered the service of the Southern Express Company at Memphis, and in 1884, the Plant system of railroads having meanwhile been founded by his father, he became vice-president of the corporation and retained this position until 1902, when the system was merged with the Atlantic Coast Line railroad company, of which he then became a director. He also became the head of a great system of ocean transportation lines, of which his father was founder, and he vastly extended them.

Plantagenet, *plan taj′e net,* a surname first given to Geoffrey, count of Anjou, and said to have originated from his wearing a branch of broom (*planta genesta*) in his cap. This name was borne by the fourteen kings, from Henry II to Richard III, who occupied the English throne from 1154 to 1485. In 1400 the family was divided into the branches of Lancaster and York, and from their union in 1485 sprang the House of Tudor.

Plan′tain, the name of a family which includes several species of well-known weeds. The *common,* or *greater, plantain,* has a rosette of light green leaves, from the center of which long, cylindrical spikes, bearing greenish, inconspicuous flowers, are sent up. This perennial weed is often a pest in lawns and gardens, choking the growth of all crops. Another species, known as *bracted plantain,* or *rib grass,* is very abundant through the Middle and Western states. It ripens innumerable seeds, and as these are frequently mixed with grass and clover seeds, the plant is widely distributed.

GREATER PLANTAIN

The name plantain is given to a tree of the East Indies, cultivated in almost all tropical countries for its fruits, which grow in large clusters. These fruits are among the most useful in the vegetable kingdom and are the sole food of many of the inhabitants of tropical regions. The fibers obtained from the leafstalk of a species which grows in the Philippine

Islands supplies Manila hemp, from which cordage of the strongest character is made. From the finer fibers a serviceable cloth is woven.

Plant Lice. See APHIDES.

Plas'tering is the art of covering the surface of masonry or woodwork with mortar, cement, staff or stucco, in order to give it a smooth and uniform surface. The wall is generally first covered with laths, or thin strips of wood, with narrow spaces between them. The face of the first coat, which should be of considerable thickness, is troweled, or indented, with cross lines, to form a key for the finishing coats. The second coat is applied when the first is thoroughly dried. It is rubbed in with a flat board, so as thoroughly to fill the indentations and cover the unequal surface of the first coat with a smooth and even one. In plastering walls, great care must be taken to have the surface perfectly vertical. The setting coat, which is of pure lime or, for moldings or finer work, of plaster of Paris or stucco, is applied to the second coat before it is quite dry. A thin coating of plaster of Paris is frequently applied to ceilings after the setting coat. See CEMENTS.

Plaster of Paris, the name given to gypsum, when ground and used for making casts and molds. If one part of powdered gypsum be mixed with two and a half parts of water, a thin pulp is formed, which after a time sets to a hard, compact mass. By adding a small quantity of lime to the moistened gypsum, a very hard, marble-like substance is obtained, after allowing the mixture to stand. See GYPSUM.

Plata, *plah'ta,* RIO DE LA, a river of South America, which runs for more than 200 mi. between the Argentine Republic and Uruguay. It is not, strictly speaking, a river, but rather an estuary, formed by the junction of the great rivers Paraná and Uruguay. It flows into the Atlantic Ocean between Cape Saint Antonio and Cape Saint Mary, and it has, at its mouth, a width of 143 miles. On its banks are the cities and ports of Montevideo and Buenos Ayres. Navigation is hampered in some parts of the river by shallow water and sand banks. It was discovered in 1515 by Diaz de Solis and was called Rio de Solis; it owes its present name to Sebastian Cabot.

Plataea, *plah te'a,* an ancient city of Greece, in Boeotia. At the Battle of Marathon the Plataeans aided the Athenians, and for this, Xerxes destroyed their town in 480 B. C. It was rebuilt, however, and during the Peloponnesian War it remained such a firm ally of Athens that it was taken by the Spartans. In 373 B. C. it was again destroyed by the Thebans. During the time of Alexander the Great it was rebuilt, but it was never again of much importance.

Plateau, *pla to',* an elevated tract of land, with a nearly level surface or one that has been sculptured by rivers. Plateaus are elevated plains and are associated with mountain systems, being found between the upper ranges of the system. They are usually at one side of the continent, and their greatest length follows the front of the mountain ranges. They are hundreds and even thousands of miles in extent. The most noted plateaus of the world are the Rocky Mountain plateau, in the United States; the Andean plateau, in South America, and the plateaus of Tibet and Pamir, in Asia. These latter are the highest and most extensive in the world. Plateaus were formed by the gradual uplifting of the land, and they have risen so gradually from the plains that in many instances it is difficult to determine the line of separation between the plateau and the plain. In some instances plateaus have been sculptured into hills, and the crests of the hills have a common level. In arid regions, canyons cut the plateaus into tablelands (See TABLELAND; BUTTE; MESA). The high plateaus between mountains are usually rude and barren. Some, because of their altitude, have a climate too cold for successful agriculture. This is true of the plateaus of Tibet and Pamir. Others are robbed of moisture by the surrounding mountains, but occasionally streams flow down the sides of these mountains and form fertile deposits known as alluvial fans. Wherever these occur, they have an appearance similar to that of an oasis in a desert. See MOUNTAIN; PLAIN.

Pla'ting, the coating of a metallic article with a thin film of some other metal, especially gold or silver. As regards plating with precious metals, electroplating has entirely superseded the old Sheffield method, which consisted in welding plates of various metals at high temperatures. See ELECTROTYPING.

Plat'inum, a metal first made known to Europe in 1736. Native platinum occurs mostly in small, irregular grains, generally containing a little iron, and it is accompanied, besides, by iridium, osmium, rhodium, palladium and ruthenium (hence called the "platinum metals") and sometimes by copper, chromium and titanium. It was first obtained in Peru and has since been found in various other localities, as Canada, Oregon, the West Indies, Brazil, Colombia, Borneo and Asia. The chief supply of platinum ore comes from the Ural Mountains in Siberia. It was there discovered in beds of gold-bearing sands in 1823, and it has been mined by the Russian government since 1828.

Pure platinum is almost as white as silver, takes a brilliant polish and is highly ductile and malleable. It is the heaviest of the ordinary metals and the least expansive when heated. It undergoes no change from the combined agency of air and moisture, and it may be exposed to the strongest heat of a smith's forge, without suffering either oxidation or fusion. Platinum is not attacked by any of the pure acids. Its only solvents are chlorine and nitro-muriatic acid, which act upon it with greater difficulty than on gold. In a finely divided state, it has the power of absorbing and condensing large quantities of gases. On account of its power of withstanding heat and the action of chemical reagents, platinum is much used as a material for making such vessels as crucibles and evaporating dishes, to be used in the chemical laboratory. The useful alloys of platinum are not numerous. With silver, it forms a tolerably fusible white alloy, malleable and brilliant when polished; but it scales and blackens when worked. Gold combines with platinum, and the alloys, in all proportions, are more fusible than the latter metal. Alloyed with iridium (a rare metal of the same group), platinum possesses an excellent and unalterable surface for fine engraving, as in the scales of astronomical instruments. This alloy has also been adopted for the construction of international standards of length and weight. A coating of platinum can be given to copper and other metals by the application of an amalgam of spongy platinum and mercury, the latter being then driven off by heat. Steel unites with platinum in all proportions, and in the proportion of from one to three per cent of platinum, it forms a tough and tenacious alloy, well adapted for cutting instruments. Platinum is extracted from the accompanying substances by several different methods, which are known as *wet* or *dry*. In the wet method, which is the one principally employed, the processes are chemical, while in the dry methods, heat is the chief agent and does not secure pure platinum.

Pla'to (427–347 B. C.), an eminent Greek philosopher, the founder of the Academic school of philosophy. His real name was Aristocles, but he was given the name Plato because of his broad brow. Such was his learning and ability that the ancient Greeks declared him to be the son of Apollo and told how, in his infancy, bees had settled on his lips, as prophecy of the honeyed words which were to flow from them. After receiving the education of a noble Athenian youth, Plato came under the influence of Socrates and was his most devoted follower. During the ten years following the death of Socrates, Plato traveled extensively. At the age of forty he returned to Athens and founded the Academy, where for forty years he taught his philosophy (See ACADEMY). His most celebrated pupils were Aristotle and Demosthenes.

Plato is best known for his arguments on the immortality of the soul. He believed in one eternal God and in a previous, as well as a future, existence. He asserted that reality did not belong to individual things, as, *this man, this book* or *this tree*, but to the general idea of *book, man* or *tree*, and that all general ideas combined formed a unity, God being the supreme, all-inclusive idea. See PHILOSOPHY.

Plato's works were written in the form of dialogues, Socrates being represented as the principal speaker. His style was considered so perfect that it was a common ancient saying that if Jupiter had spoken Greek, he would have spoken like Plato. The thirty-five dialogues ascribed to Plato are in existence, but seven of these are considered spurious by the best authorities. His best-known works are *The Republic*, in which he explains his ideal of a city, which was to be one founded on justice; *Phaedrus* and *The Symposium*, in which he sets forth the doctrines of love, whereby sensuous passion is made the symbol of spiritual exaltation and of all aspirations toward the good, the beautiful and the true, and *The Apology*, a defense of the doctrines of Socrates.

Platt, ORVILLE HITCHCOCK (1827–1905), an American politician, born at Washington, Conn. He received an elementary education, was admitted to the bar in 1849 and began practice at Meriden. He was elected to the state senate and later to the lower house of the legislature, where he served one year as speaker. In 1879 he was chosen to the United States Senate and was four times reëlected. He won special fame as the author of the famous Platt Amendment, which was incorporated in the constitution of Cuba.

Platt, THOMAS COLLIER (1833–1910), an American politician, born at Owego, N. Y. He was educated at Yale College and later became president of Tioga National Bank. He was in the lower house of Congress from 1872 to 1876 and was chosen United States senator in 1881, but he resigned this position on account of a disagreement with President Garfield as to Federal patronage, and he failed of reëlection. In 1880 he became president of the United States Express Company and was elected United States senator from New York in 1897 and in 1903.

Plattdeutsch, *plaht′ doich,* or **Low German,** the language of the North German Lowlands, from the borders of Holland to those of Russian Poland. The Dutch and Flemish languages also belong to the Low German dialects, but, being associated with an independent political system and having a literature of their own, they are reckoned as distinct languages. The Low German dialects agree in their consonantal system, not only with Dutch and Flemish, but also with English and the Scandinavian tongues (See PHILOLOGY). Until the Reformation, Low German was the general written language of the part of the Continent above mentioned; but from the time of Luther's translation of the Bible into High German, the latter has been recognized as the superior literary language. Even as a spoken language, High German has ever since been slowly superseding the Low. In recent times, however, Low German literature has received a new impetus, and its dialects have received a good deal of attention from scholars.

Platte, a river which rises in the Rocky Mountains in two branches, called, respectively, the North Fork and the South Fork. These unite in Lincoln County, Neb., and the Platte River flows in a generally easterly direction and falls into the Missouri River. Its length, including the North Fork, is about 1250 miles. It is from one to three miles broad, is shallow and encumbered with islands and has a rapid current. Therefore it is not useful for navigation.

Platts′burg, N. Y, the county-seat of Clinton co., 167 mi. n. of Albany, on Lake Champlain, at the mouth of the Saranac River, and on two lines of the Delaware & Hudson railroad. It was settled in 1784 and was incorporated the next year. Just to the south is Valcour Island, near which the first naval battle was fought between the British and American fleets, on Oct. 11, 1776. During the War of 1812, the village was the headquarters of the United States forces on the north, and in Plattsburg Bay the British fleet was defeated Sept. 11, 1814, in the Battle of Lake Champlain. In 1849, and again in 1867, a large part of the business section was destroyed by fire. The village has a picturesque location on Cumberland Bay, which affords a good harbor. In the vicinity are many popular summer resorts. A state normal school is located here, and the municipality has a public library and four other libraries. Other important structures are the Federal building, the courthouse, the jail and the homes for friendless and for aged women. About a mile to the south is a large national military post, known as Plattsburg Barracks. The Catholic Summer School of America convenes at Cliff Haven, two miles south of the village. Plattsburg has a valuable lumber trade and contains lumber mills, a sewing machine factory, foundries, machine shops, flour, woolen and pulp mills and other factories. Population in 1905, 10,184.

Platts′mouth, NEB., a city of Cass co., situated on the Missouri River, at the mouth of the Platte, 22 mi. s. of Omaha, and on the Chicago, Burlington & Quincy and the Missouri Pacific railroads. Its leading industrial establishments include flour mills and railroad shops. It is also an important shipping point for grain and cattle. Population in 1900, 4964.

Plau′tus, TITUS MACCIUS (about 254–184 B. C.), one of the oldest and greatest of the Roman writers of comedy. We have few particulars of his life. He is said to have been connected with a dramatic company at Rome and then to have engaged in business. But he lost his means, became destitute and was compelled to earn his livelihood by turning a baker's hand mill. While he was thus engaged he wrote three comedies, which were produced at public festivals and which brought him immediate fame. The purity of his language, his genuine humor and his faithful portrayal of middle and lower class Roman life made him a great favorite with the Roman public, and his plays successfully held the stage for some centuries. He was much admired by Cicero and Varro. For his characters, plots and scenes, he was chiefly indebted to the comedy writers of Greece; but the language was his own, and the plays were made thoroughly Roman. Twenty of his plays have been preserved, among which are *Amphitryon, The Captives* and *The Twins.*

Plebeians, *ple be′yanz,* the common people of ancient Rome. They were at first excluded from nearly all the rights of citizenship. The whole government of the state, with the enjoyment of all its offices, belonged exclusively to the patricians, with whom the plebeians could not even intermarry. The civil history of Rome is to a great extent composed of the struggles of the plebeians to assert their claim to the place in the commonwealth to which their numbers and social importance entitled them, and their efforts were crowned with complete success in the third century B. C. From this time the privileges of the two classes may be said to have been equal.

Plehve, WJATSCHESLAVO KONSTANTINOVITSCH VON (1848–1904), a Russian minister of the interior. He was the son of a poor nobleman, but was patronized by a wealthy aristocrat, and when of age he became, successively, imperial counsel at Warsaw, procurator at Saint Petersburg, chief of state police, assistant minister of interior and, in 1902, minister of interior. He had a reputation for great severity toward the dependent peoples of Russia. Plehve was assassinated at Saint Petersburg, July 28, 1904.

Pleiades, *ple'ya deez,* the so-called "seven stars" in the neck of the constellation Taurus, of which only six are visible to the naked eye of most persons. They are regarded by Mädler as the central group of the Milky Way. Ancient Greek legends derive their name from the seven daughters of Atlas and the nymph Pleione, fabled to have been placed as stars in the sky, and the loss of the seventh was variously accounted for. In reality the cluster consists of far more than seven stars.

Pleura, *plu'ra,* THE, a serous membrane, one layer of which, the *visceral,* invests the lungs and separates the lobes from each other, and the other, the *parietal,* adheres to the surface of the chest walls. In a healthy condition, these layers are in contact, and during respiration they move freely upon each other, a lubricating fluid being secreted that prevents friction. The pleura serves to hold the lungs, and to a lesser extent the other organs of the chest, in position, and it makes easy the movement of the parts necessary to respiration. See PLEURISY.

Pleurisy, *plu're sy,* a disease arising from the inflammation of the pleura, or the membrane which covers the lungs. The first symptoms are usually chills, fever, a sharp pain in the side or chest, and a dry cough. The pain gradually increases until the slightest movement, especially breathing, causes the greatest suffering. In most cases a peculiar liquid passes into the pleural cavity, causing the growth of bacteria, which sometimes set up violent and even fatal complications. Usually, however, the amount of the fluid is so small that it is quickly absorbed. Relief immediately follows, and complete recovery takes place within a few days. Occasionally an operation is necessary.

Plin'y the Elder (23–79), a Roman writer, whose real name was Caius Plinius Secundus. He went to Rome at an early age and, having means at his disposal, availed himself of the best teachers. He served with distinction in the field and, after having been made one of the augurs of Rome, he was appointed governor of Spain. Every leisure moment was devoted to literature and science, and his industry was so great that he collected an enormous mass of notes, which he utilized in writing his works. He perished in the eruption of Mount Vesuvius, which overwhelmed Pompeii and Herculaneum in 79, and his death is described in two letters of Pliny the Younger, his nephew and adopted son. The only work of Pliny which is now extant is his *Natural History,* a work containing a fund of information on physics, astronomy, geography and meteorology, as well as natural history proper.

Pliny the Younger (62 A. D.–?), a nephew of Pliny the Elder; his full name was Caius Plinius Cecilius Secundus. Having lost his father at an early age, he was adopted by his uncle and he inherited the latter's estates and manuscripts, as well as his habits of industry and love of literature. He filled several public offices and was consul in 100. In 103 he was appointed propraetor, or governor, of Pontica, and this office he administered for almost two years, to the general satisfaction. He was one of the most distinguished and best men of his age. The time of his death is unknown, but it is supposed that he died about the year 115. As an author he attempted both prose and poetry, but of his writings, only a collection of letters, in ten books, and a panegyric on Trajan remain.

Pliocene, *pli'o seen,* **Epoch,** the name of that portion of geologic time constituting the last division of the Tertiary Period. The formations of the Pliocene epoch are of great importance in Europe, but they are found only in small areas in the United States, the most important one being near San Francisco. The life of the Pliocene epoch was similar to that of the present time. Such animals as the llama, the camel, the horse, the mastodon, the rhinoceros and the tiger inhabited North America, and the animals of Europe resembled some of the species now found in Africa. See TERTIARY PERIOD.

Plover, *pluv'ur,* the common name of several species of wading birds, which inhabit all parts of the world. They are round-bodied, plump, and usually good game birds. Their bills are much like those of pigeons. The birds are usually to be seen in flocks along muddy borders of rivers and in marshy tracts, where they live on worms and aquatic insects, though some species prefer dry sandy shores and stubble fields. Their classification is difficult, as the species grade one into another almost imperceptibly. The *golden plover* of Europe and Asia has black plumage, spotted with white and yellow on the back. In summer it is found as far north as the arctic regions, and in winter, crossing the Torrid zone, it goes as far south as Patagonia. The American *kildeer* is a pretty little plover with a black collar. The New England species, called the *wrybill*, has a bill bent sharply to one side, enabling the bird to pick up insects from round stones. The ring plover, common on British coasts, has a light brown back and wings, a white crown and a white throat and breast, with a narrow black ring about the neck.

Plow, an implement used by farmers to break up the soil and turn it over. The earliest plows and those still in use in some countries of the Far East were pointed sticks, which were drawn by men or animals. The important parts of the modern plow are the moldboard, for turning over the soil; the beam, to which the other parts are attached and by which the plow is held; the stilts, or handles; the knife, or colter, which cuts the turf and roots; the share, which tears up the soil, and the landslide, which runs next to the land not cut by the furrow. Formerly the beam and handles were made of wood, but now all parts of the plow are made of iron and steel. A small truck is often attached to the forward end of the beam, for the purpose of regulating the depth of the furrow. Plows are manufactured in a great variety of styles, to suit the different purposes for which they are intended.

PLOW

The *sidehill* plow has the moldboard and share fastened to the beam by a joint, so that they can be swung from one side to the other, thus enabling the plow to move forth and back, turning furrows in the same direction. *Sulky*, or *wheel*, plows rest upon two wheels, to which is attached a seat for the driver. The wheel running in the furrow is usually larger than the other. These plows have two or more shares attached to the frame, thus forming a *gang*. They are extensively used in plowing land upon large farms on the prairies. The *steam* plow is hauled by a traction engine, but the weight of the engine so compacts the soil as to injure its productiveness, and this, combined with the expense of the outfit, makes these machines an unprofitable investment. More plows are manufactured in the United States than in any other country, and American plows are found in all parts of the world where agriculture is an important industry.

Plum, a stone fruit, closely related to the peach and the apricot. The common *garden plum*, introduced from Asia Minor, is the most extensively cultivated, and its fruit is one of the most familiar of the stone fruits. The varieties are very numerous, differing in size, form, color and taste. Some are eaten fresh, some are dried and sold as prunes (See PRUNE), while others are preserved in sugar, alcohol, syrup or vinegar. Plums also make excellent jams and jellies, and the syrup from stewed plums forms a refreshing drink for invalids. Perhaps the most esteemed of all varieties is the *green gage*. A very popular and easily grown sort is the *damson*. The wood of the plum tree is hard, compact, traversed with reddish veins and susceptible of a fine polish, and it is employed by turners and cabinetmakers.

The *sloe*, or *blackthorn*, is a species of wild plum that bears a small, round, blue-black and extremely sour fruit. Its juice is made into prune wine, which is chiefly employed by distillers and wine and spirit merchants, for coloring, purifying and mellowing spirits. See FRUITS, *color plate*, Figs. 5, 6, 7, 8.

Plumba'go. See GRAPHITE.

Plum'met or **Plumb Line**, a leaden or other weight, let down at the end of a cord, to regulate any work in a line perpendicular to the horizon or to sound the depth of anything. Masons and carpenters use a plumb line, fastened on a narrow board or plate of brass or iron, to judge whether walls or other objects are perpendicular, or *plumb*. Near a range of high mountains the plumb line is not perfectly true, but is deflected toward the mountains by the attractive power of the mountain-mass.

Plush, a fabric very much like velvet, but with a longer and softer nap. It is made of worsted, with a mohair pile, or cotton, with silk pile. Worsted plush is used in making cloaks, caps and other articles of wearing apparel; that with a silk pile is used for men's silk hats and for ornaments on women's hats and dresses. Worsted and mohair plush is used for upholstering furniture. London, Lyons and various cities in Germany are especially noted for the manufacture of plush.

Plutarch, *plu'tahrk,* (about 46–about 125), a Greek biographer and essayist, born at Chaeronaea in Boeotia, where he also died. It appears from his writings that he visited Italy, lectured there on philosophy and stayed some time at Rome during the reign of Vespasian. His *Parallel Lives of Illustrious Greeks and Romans* is the work to which he owes his fame. The lives are nearly all written in pairs, one Greek and one Roman, followed by a comparison of the two, and they are models of biographical portraiture. We have numerous editions and translations of them. Plutarch's other works, about sixty in number, are generally referred to as *Moralia,* and consist of essays on philosophical and ethical subjects. His writings show that he was well acquainted with the literature of his time and with history, and that he must have had access to many books.

Plu'to, in classical mythology, the god of the lower world, the ruler of the dead. He was the son of Saturn and Rhea, and the brother of Jupiter and Neptune. It was by lot that the under world was given to him as his share of the universe, but he was peculiarly fitted for that post, as he possessed an exceedingly gloomy and taciturn nature. His wife was Proserpina, whom he had carried off in his black chariot. Pluto was greatly feared by the Greeks and Romans, and one of their prayers was that they might never see his face, as it was believed that he never appeared on earth except to find victims to take with him to his gloomy kingdom. Cerberus was the monster dog that guarded the entrance to the lower regions.

PLUTO AND CERBERUS

Pluton'ic Rocks. See Igneous Rocks.

Plu'tus, in Greek mythology, the god of riches. Jupiter struck him blind because he confined his gifts to the good, and thenceforth he conferred them equally on the good and the bad. His residence was under the earth. He was often confounded with Pluto.

Plymouth, *plim'uth,* a seaport, municipal and Parliamentary borough of England in Devonshire, at the head of Plymouth Sound, between the estuaries of the Plym and the Tamar. It is well defended, both seaward and landward, by a series of strong forts. The most notable buildings of the city are Saint Andrew's Church; Charles Church, built in honor of Charles I; the guildhall and the municipal buildings. There are numerous charitable and educational institutions. The two harbors of Plymouth give access to the largest vessels, and the city has a large export and coastwise trade. Tin, lead, copper and granite are exported in large quantities. The manufactures of the town are not very important and are chiefly connected with ships' stores, but the fisheries are valuable. The chief importance of Plymouth lies, however, in its position as a naval station. It was from Plymouth that Drake set out on his expedition to sail around the world, and the *Mayflower,* on starting for America, touched at Plymouth, from which she finally set sail in September, 1620. Population of Plymouth proper in 1901, 107,636; of the Three Towns, as Plymouth, Stonehouse and Devonport together are known, 182,971.

Plymouth, Mass., the county-seat of Plymouth co., 35 mi. s. e. of Boston, on Plymouth harbor, a part of Massachusetts Bay, and on the New York, New Haven & Hartford railroad. It was here that the Pilgrims settled in 1620 (See Pilgrims). Some of the special features of interest are Plymouth Rock, on which tradition says they first landed; Pilgrim Hall, where books, pictures and other relics of early days are kept; Cole's Hill and Burial Hill, which contain the graves of many settlers, and the large national monument to the Pilgrims, composed of a statue of Faith, surrounded by figures of Morality, Law, Education and Freedom. The town contains Morton Park and a public library, and owns the waterworks. The harbor is large, but shallow, and there is some coasting trade. A number of vessels are employed in the fisheries. The town contains manufactures of cordage.

woolen and knit goods, nails, tacks, electrical supplies and other articles. The beautiful and historic situation attracts many tourists. Population in 1905, 11,119.

Plymouth, Pa., a borough in Luzerne co., 4 mi. w. of Wilkesbarre, on the Susquehanna River and on the Delaware, Lackawanna & Western railroad. The mining of anthracite coal is the principal industry, and there are also manufactures of mining tools, hosiery, silk and other articles. It has public and parish schools, a high school and a national bank. The place was settled by the Susquehanna Company in 1768. Population in 1900, 13,649.

Plymouth Colony, a settlement made at the present site of Plymouth, Mass., in 1620, by a party of English Separatists, who had lived for twelve years in Holland. The party arrived in the *Mayflower*, November 11, and disembarked December 21, on Plymouth Rock. They suffered terribly from starvation, exposure and disease during the following winter and lost some of their most valued leaders, including John Carver, the first governor. He was succeeded by William Bradford, who for more than thirty years was the leading spirit of the colony. For later history, see Massachusetts, subhead *History*.

Plymouth Rock, the rock in the harbor at Plymouth, Mass., which is said to have been the first landing place of the Pilgrims in 1620. It is now protected by an ornamental iron railing and a granite canopy.

Plymouth Sound, an inlet of the English Channel, extending between Devon and Cornwall. Its upper extremity is entered by the Plym River, the estuary of which forms a part of the harbor of Plymouth. The sound contains a number of islands, Saint Nicholas, or Drake's Island, being strongly fortified. This little sheet of water is important as a naval station, since it affords anchorage for the largest battleships and the harbor is protected by a breakwater more than a mile long.

Pneumatic, *new mat'ik,* **Dispatch',** a system of sending mail and packages of merchandise through tubes, by means of the pressure of air. The apparatus consists of a tube or series of tubes, air-tight cylindrical carrying cases and an air compressor. The cases are forced through the tube either by the increase of the pressure of the air back of the carriage or by the exhaustion of the air in front of it, which creates a partial vacuum. By this plan the carriage is forced along by the ordinary pressure of the air. For a number of years pneumatic dispatch has been employed in Berlin, Paris, London and other large European cities. It is particularly useful in sending mail between the central postoffice and suburban stations in a large city; also, for collecting and distributing telegraphic messages. However, it has never been extensively used in the United States. The postoffice authorities have established systems in Philadelphia, New York and Chicago, and the Western Union Telegraph Company uses the system in most cities for collecting and distributing messages. Many large retail stores employ a similar system for carrying cash.

Pneumatics, that branch of physics which treats of the mechanical properties of gases. Pneumatics treats of the weight, pressure, equilibrium, elasticity, density, condensation, rarefaction, resistance and motion of air; it treats also of air considered as the medium of sound and as the vehicle of heat and moisture. It also comprehends the description of those machines which depend chiefly for their action on the pressure and elasticity of air, as the various kinds of pumps and artificial fountains. See Air Pump; Pump.

Pneumatic Tires, circular, rubber tubes, inflated with air, placed on the wheels of vehicles, especially bicycles, automobiles and fine carriages, for the purpose of lessening jars and jolts and of reducing noise. The rubber used for pneumatic tires comes to the factory in large lumps, known as "hams." These lumps of crude rubber are cleaned and made into sheets. They are then taken to the drying room, where they are subjected to a temperature of 90° for about 24 hours. The gum used for the inner tubes is left more nearly pure than that used for any other purpose. The gum and other ingredients are passed between a pair of smooth, hollow, iron rollers, running at different rates of speed. When the compound has been thoroughly warmed by this friction, it comes from the rollers in a smooth, semi-transparent sheet of delicate, chocolate tint. The sheet is then carried to the calenders, where it is drawn down to a still thinner sheet. At the same time it is cut to the width required for making a tire. It is then rolled up on a wooden core, with a sheet of muslin between the layers of rubber. Next the rubber goes to the tube room, where it is cut into proper lengths for a tube. The strips are then rolled into shape, after both surfaces have been covered with soapstone. A nozzle is attached to the end of the tube, and soapstone is blown through it to prevent adhesion of the inner surface. The tubes are then inspected and cut into the exact lengths and the ends are closed up. In the curing room the tubes go into a heater, where they are subjected to a pressure of forty pounds for about four hours. The stems, through which the tires are to be inflated, are set on with a rubber solution. Then the tires are subjected to a final inspection, the valves are put into the stems and they are tied.

The casing stock, from which the outer part of the tire is made, is mixed by a different process from that used for the tube stock, but the process of making the tube is the same. The "friction cloth," which forms the inner part of the outer tube, is made of strong duck. It is passed through a calender, which presses rubber, mixed by still another secret process, upon both sides and into the meshes of the cloth, under enormous pressure. This friction cloth is cut into diagonal strips, just half the length necessary for a tire.

In the building room, two strips of friction cloth are laid on a bench with a little groove down the center. A steel mandrel, the size of the tire, is lifted on the bench and rolled down the groove, the friction cloth being taken up and rolled around the mandrel as it rolls. The mandrels are warm and are painted with a solution of soapstone, to prevent the rubber from sticking. A strip of casing stock is then laid down over the groove on the bench, and the mandrel, covered with the friction cloth, is rolled back the other way, the builder gathering up the casing and pressing it upon the friction cloth until it adheres smoothly upon the outer surface. From the builders the mandrels and tubes go to the press room, where they are put in large iron molds and subjected to heavy pressure and heat. They are then taken out and thrown upon a bench, where a slit about six inches long is cut on the inner side of the tubes. The mandrels are then drawn out. The casings then go to the trimmers and to the perforator, who add the finishing touches. The next process is to draw the tubes through the casing. The tires are then inflated, taken to the storage room and made ready for shipment.

Pneumatic Tools, tools operated by compressed air. Most pneumatic tools are hand tools, and the mechanism for operating them is placed in the handle. They are divided into two classes—those which work as hammers and those which have a rotary motion. To the first class belong the hammer proper, chipping tools, rock drills, riveting machines and caulking machines. The rotary tools include various kinds of boring machines for metal and wood. The tools of the first class are used in metal working and in carving wood. The air is conveyed to the handle by a flexible hose and usually has a pressure of from 80 to 90 pounds to the square inch, except for riveting machines, in which it has a pressure of about 125 pounds to the square inch. The speed and force with which the tool operates are controlled by means of a valve in the handle.

Pneumonia, *new mo′ne a,* an infectious disease of the lungs, caused by minute bacteria. Pneumonia is apt to attack people who are in a weakened physical condition. It begins with a chill, followed quickly by fever, which lasts usually to the tenth or eleventh day, when a distinct crisis occurs, after which, if it is safely passed, the patient recovers. Death comes from heart failure, due to the poisonous products of the bacteria. It is not possible to cut short the duration of the attack by medical treatment, but much may be done to keep up the patient's strength, to stimulate and support the action of the heart and to reduce the temperature in the fever. In the final stage, too, assistance may be rendered in bringing up the waste matter which is cast off by the lungs. Unlike many of the bacterial diseases, one attack of pneumonia does not render a person immune from another, but it seems rather to leave a tendency to a recurrence of the disease.

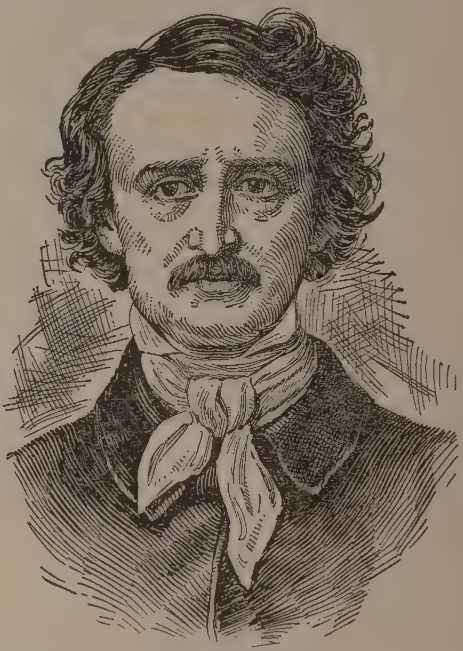
Po, the largest river of Italy. It rises on the confines of France and Piedmont, in Monte Viso, divides the great plain of Lombardy into two nearly equal parts and receives the waters of the streams flowing south from the Alps and north from a part of the Apennine range. Among its principal tributaries are the Ticino, the Adda, the Oglio, the Mincio, the Trebbia and the Penaro. The chief cities on the banks are Cremona, Piacenza and Turin. The Po, in spite of embankments, is the cause of frequent inundations, especially near its mouth. In some places, owing to the silt carried down, its channel is raised above the country through which it flows. There is also an extensive delta at its mouth. The river is abundantly supplied with fish

Po′cahon′tas (1595–1617), daughter of the indian chief Powhatan, of Virginia. Some romantic incidents are told of her life, but there seems to be reason for doubt as to their truth. She is said to have shown a great friendship for the English who colonized Virginia and to have saved the life of John Smith by throwing herself between him and his executioner, when Smith was about to be put to death by the indians. Two years later she is said to have frustrated a plot to destroy Smith and his party. After Smith had left the colony she was kept as a hostage by an English expeditionary force, and during this detention she married John Rolfe, an Englishman, who in 1616 took her on a visit to England, where she was baptized and assumed the name of Rebecca. She left one son, who was educated in London, and whose descendants are said to exist still in Virginia.

Po′catel′lo, Idaho, the county-seat of Bannock co., 134 mi. n. by w. of Ogden, Utah, on the Port Neuf River and on two divisions of the Oregon Short Line railroad. The surrounding region, which is of volcanic origin, has been made very productive by means of irrigation. Mining, stock raising and agriculture are the leading industries. Electrical power is generated at the American Falls, on the Snake River, and the city has large railroad shops, machine shops, stockyards and other establishments. In size it is the second city in the state, and it conducts a large trade in live stock and farm produce. The Academy of Idaho, a state institution, is located here. The city is laid out with well-graded streets, lined with shade trees. Population in 1900, 4046; estimated in 1904 at 6300.

Poe, Edgar Allan (1809–1849), an American poet and story writer, born at Boston. On the death of his mother, when he was but two years old, Poe was adopted into the family of Mr. John Allan, of Richmond, Va. He was given a good education and was sent, finally, to the University of Virginia, from which, however, he was withdrawn by Mr. Allan, perhaps because of losses at gambling. After serving for two years in the United States army, Poe was sent to West Point, but was soon dismissed in disgrace. This caused a final rupture with Mr. Allan, and Poe was put upon his own resources. He married, in 1833, his young cousin, Virginia Clemm, and soon afterward he became connected with a magazine in Richmond, to which he contributed tales, poems and literary criticisms. He did not hold this position long, however, and the same was true of positions which he secured on other magazines. The long illness of his wife, whom he loved devotedly, and her death in 1847 prostrated Poe, and from this time he drank more and more frequently. In October, 1849, he was found unconscious in a drinking place in Baltimore and was taken to a hospital, where he died.

Poe's fame rests chiefly on his poetry, which is unsurpassed in its musical rhythm and its marvelously effective combinations of sounds. The best known of his poems are *The Raven, The Bells, Annabel Lee, Ulalume* and *To Helen.* The perfect art of the tales, of which *The Fall of the House of Usher, Ligeia, The Masque of the Red Death* and *The Gold Bug* are typical, marks Poe as one of the masters of short story telling.



EDGAR ALLAN POE

Poet Laur′eate. See Laureate, Poet.

Po′etry, in its widest sense, any artistic productions of the human mind expressed in language, but in a narrower and more common sense, an artistic production in rhythmical or metrical language. It is the earliest form of literature and also the final and ideal form of all pure literature, its true place lying between music and prose. The two great classes of poetic impulse are dramatic imagination and lyric imagination. Partaking of the character of both is epic, or narrative, poetry. To the dramatic class belong tragedy and comedy; to the lyric belong song, hymn, ode, elegy, sonnet and ballad, though the last named frequently has a kind of epic character. Other forms, such as didactic poetry and satirical poetry, are also in use, but it is a question whether they enter into the circle of poetry at all.

For the various kinds of poetry see DRAMA; LYRIC POETRY; EPIC; BALLAD; SONNET; ODE; ELEGY.

Pointer, a hunting dog, of the hound group. It is smooth and short-haired, generally marked black and white, like the fox hound, and it has a large head, big drooping ears and a slender pointed tail. It receives its name from the fact that when it discovers a bird it stands still, holds its breath and points with its head in the direction of the game. Pointers do not like the water.

POINTER

Point Levi, *la ve'*. See LEVIS.

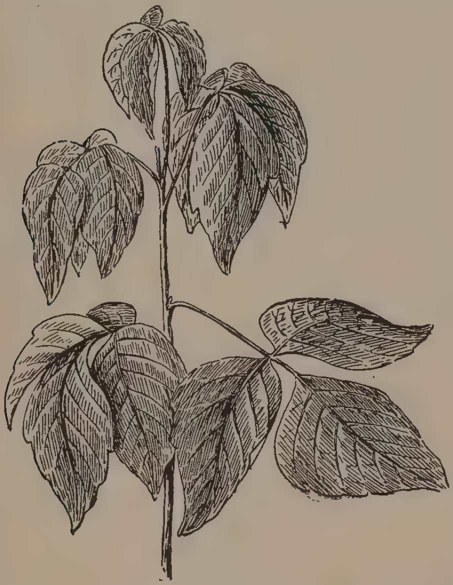
Poison, *poi'z'n,* any substance which, introduced into the body, produces dangerous or deadly effects. Some poisons are of animal origin, while others belong to the vegetable or mineral kingdom. Many poisons operate chemically, eating or corroding the tissues and causing inflammation and mortification. Examples of these irritants are many metallic oxides and solids, such as arsenic; many preparations of copper, mercury, antimony and other metals; the mineral and vegetable acids, and substances derived from some plants. Other poisons exercise a powerful action upon the nerves and cause the rapid destruction of their energy. These are acids or narcotic poisons, and most of them belong to the vegetable kingdom; opium, hemlock, henbane and belladonna are the best-known forms. Prussic acid, obtained from the kernels of such fruits as the lemon and cherry laurel, is one of the most rapid and deadly. From the monkshood, or aconite, a substance is extracted so poisonous that one-sixteenth of a grain has proved fatal. Some things, such as illuminating gas or the suffocating vapors from suphur and charcoal, cause death by making breathing impossible. The effect of poisons depends on the extent of the dose, some of the most deadly poisons being useful remedies, if taken under proper conditions and in right quantities.

In treating all cases of poisoning, three things should be remembered: first, to neutralize the poison as quickly as possible by an antidote (See ANTIDOTE); second, if the poison has been introduced by way of the stomach, to empty and wash that organ as quickly as possible; third, to overcome the action of whatever poison may have been absorbed into the system by stimulating the life-forces in natural ways. The stomach may be emptied by means of an emetic, but this should not be used if the poison has a strongly corrosive effect and it is feared that the tissues of the stomach have been injured. The most useful emetics are warm water and mustard, large quantities of warm milk, oils, butter, lard, soapsuds or a weak solution of salt and water. The emetic that is most available and will act most quickly is the one to use. If the poison was an irritant, the alimentary canal should be protected by giving such fluids as flaxseed tea, the white of eggs, milk and barley water. If the poison entered by way of a wound, as in case of a snake bite or dog bite, the first step should be to cleanse the wound. If there are no cuts or sores in the membranes of the mouth, the wound may be safely emptied by sucking it, providing the contents are quickly spit from the mouth and that organ thoroughly washed. A tight bandage should be promptly placed above the wound, which ought to be seared with a heated iron or some other cautery. In all cases, a physician should be summoned as quickly as possible, and his directions should be carefully followed.

Poison I'vy, a climbing or trailing shrub, sometimes erect, with aërial roots and groups of three leaflets, each notched and generally pointed. This plant is often confused with the Virginia creeper, which it closely resembles, but which has five leaflets, instead of three. The poison ivy spreads very rapidly by means of its roots and seeds, and it is a very poisonous weed. It blooms in the heat of the summer, having yellow flowers about a quarter of an inch in diameter. The only means of destroying it seems to be by repeated grubbing. See SUMAC. (See illustration on next page.)

Poisonous Plants, a term applied to plants which are poisonous to the touch or when taken into the stomach. The name cannot cover a definite class of plants, because some plants that seem poisonous to one person are harmless to another; some plants that are poisonous when growing are harmless when cooked; some plants are eaten by animals and are feared by people. The poisonous juices of many plants make valuable medicine when properly prepared.

In the United States there are several plants generally considered poisonous to the touch, among which are poison ivy and poison sumac, both of which to some persons are poisonous and to others are harmless, and the *Virginia creeper*, or five-leafed ivy, which, usually harmless, is noxious to some persons. There are many other plants scattered through different families, from fungi to the highest types of seed-bearing plants, which, if eaten, cause illness or even death. The mushrooms are probably the most dangerous, because of the resemblance between the poisonous and the edible species. Among the flowering plants which are poisonous are black nightshade, belladonna, henbane, poison hemlock and water hemlock. There are other plants of similar properties to be found in the United States, either native or introduced from abroad. Among these are hellebore, pokeweed, digitalis, lobelia and aconite.


POISON IVY

Poitiers, *pwah tya'*, a town of France, capital of the Department of Vienne, on a peninsula formed by the junction of the Clain and the Boivre rivers, 58 mi. s. w. of Tours. Its chief building is its twelfth-century cathedral, in the Gothic-Romanesque style of architecture. Poitiers is one of the oldest towns of France and has the vestiges of a Roman palace, of Roman baths and of an aqueduct. There is a university in the town and a municipal library of 65,000 volumes. Two famous battles were fought in its vicinity, one, the battle in which Charles Martel defeated the Saracen army, in 732; the other, that between the French, under John II, and the English, under the Black Prince, in 1356. Population in 1901, 31,785.

Poker. See DRAW POKER.

Pokeweed, a large plant, common in the United States. It is known, also, by the names of *garget, pigeon berry* and *skoke.* The poke has purple stems and large, loose spikes of berries, which are filled with a brilliant crimson juice. It is cultivated because of the reputed medicinal qualities of the berries and root. The leaves are extremely bitter, but the young shoots, when boiled in water, lose this quality and are eaten like asparagus.

Po'land, an extensive territory of central Europe, which existed for many centuries as an independent and powerful state, but which, having fallen a prey to internal dissensions, was violently seized by Austria, Prussia and Russia as a common spoil, partitioned among these three powers and incorporated with their dominions. In its greatest prosperity it had at least 11,000,000 inhabitants and an area of over 350,000 square miles. For the physical features of the country, see RUSSIA.

HISTORY. The Poles, like the Russians, are a Slavonic race, and are first spoken of in history as the Polani, a tribe or people between the Vistula and the Oder. The country was divided into small communities until the reign of Mieczyslaw I (962–992), of the Piast dynasty, who renounced paganism in favor of Christianity, and who was a vassal of the German emperor. He was succeeded by Boleslaw the Brave (992–1025), who raised Poland into an independent kingdom and increased its territories. In succeeding reigns the country was involved in war with Germany, the heathen Prussians, the Teutonic Knights and Russia. For a time it prospered, on the whole, but an invasion by the Mongols in 1240 and 1241 brought it to a critical condition. Instead of a united kingdom, the country was now but a collection of independent principalities, which were constantly at war with one another. Under Ladislas I

(1306–1333) Poland became again a united realm. The last of the Piast dynasty was Casimir the Great (1333–1370), during whose reign the material prosperity of Poland greatly increased.

He was succeeded by his nephew, Louis the Great, king of Hungary, whose daughter, Hedwig, was recognized as queen in 1384. She married Jagello, prince of Lithuania, and thus established the dynasty of the Jagellons, which lasted from 1386 to 1572. During this period Poland attained its most powerful and flourishing condition. Sigismund I (1506–1548) was one of the greatest kings of the line, and he brought the country to its highest point of prosperity. In 1572 the Jagellon dynasty became extinct in the male line, and the monarchy, hitherto elective in theory, now became so in fact. The more important of the elective kings were Sigismund III (1587–1632), Ladislas IV (1632–1648), John Casimir (1648–1669) and the Polish general Sobieski, who became king under the title of John III (See John III Sobieski). He was succeeded by Frederick Augustus I, elector of Saxony, who got entangled in the war between Russia and Charles XII and had as a rival in the kingdom Stanislas Lesczynski. Augustus III (1733–1763) followed, and by the end of his reign internal dissensions and other causes had brought the country into a state of helplessness. In 1772, under the last feeble king, Stanislas Augustus (1764–1795), the first actual partition of Poland took place. About one-third of her territories were seized by Prussia, Austria and Russia, Prussia receiving the Province of West Prussia, comprising an area of 13,415 square miles; Austria receiving Galicia and Lodomeria, 27,000 square miles, and Russia receiving part of Lithuania, 42,000 square miles. What remained to Poland was completely under Russian influence, despite the earnest struggles of the patriots under Kosciuszko. Another partition in 1793 gave Russia nearly 97,000 square miles and Prussia 22,500 square miles. Again the patriots rose, made Kosciuszko dictator and seemed in a fair way to succeed. Late in 1794, however, Kosciuszko was defeated at Maciejowice by the Russians and Prussians, and in the following year a third partition took place, by which Russia gained 45,000 square miles, Prussia 21,000 square miles and Austria 18,000 square miles. The last Polish king became a pensioner of the Russian court.

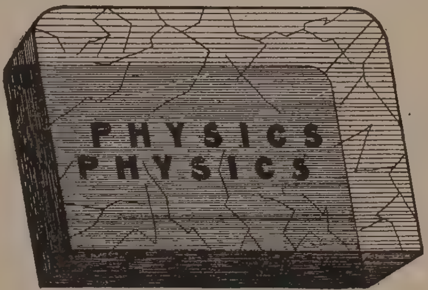
The Poles welcomed Napoleon, thinking that he would restore their liberty, and they furnished him a large number of men; but he was able to accomplish little in their behalf, and even the Duchy of Warsaw, which had been established under his suzerainty, lost its independent existence after the disastrous invasion of Russia in 1812. From 1815 to 1830 Russian Poland was a constitutional monarchy, with the emperor as king, but the Poles, seizing the occasion of the French Revolution, at the latter date rashly engaged in an insurrection, which only hastened their complete absorption in Russia. The name *kingdom of Poland* indeed remains, but all the independent institutions of the country have been swept away, and the whole country has been incorporated with Russia. The Polish language has been entirely superseded by Russian in all courts of law, educational establishments and public offices; and all official correspondence must be in Russian. The population of Russian Poland is approximately 8,000,000. Consult Morfil's *Poland*, in the Story of the Nations Series.

Polar Bear. See Bear.

Polar Exploration. See North Polar Exploration; South Polar Exploration.

Polar'iscope, an optical instrument for exhibiting the polarization of light or for examining transparent substances for the purpose of determining their polarizing power. The important portions of the instrument are the polarizing and analyzing plates, or prisms, and these are formed either of natural crystalline structures, such as Iceland spar and tourmaline, or of a series of reflecting surfaces artificially joined together. See Polarization of Light.

Po'lariza'tion of Light, the operation produced in a ray of light by the action of certain bodies, by which it is made to change its character. Since light is produced by vibrations running at right angles to the line in which the rays travel, if we could look at the end of a ray of light as we can at the end of a pencil, we should see waves running across it in every direction and



DOUBLE REFRACTION

crossing each other in the center of the ray (See LIGHT, subhead *How Light Travels*). Because of this, only a part of the waves will pass through certain substances, and those through which it passes are modified in their nature. For instance, crystals of tourmaline obstruct some of these waves and polarize those passing through, while other substances, like Iceland spar, produce a double refraction, so that an object seen through them appears double, as shown in the figure. If two crystals of Iceland spar are fitted to the tube of a microscope so that one of them can be rotated, the axes of the crystals will be brought into different angles with each other, the light passing through them is polarized and the objects seen show rainbow tints. Such an instrument is called a *polariscope*.

Some substances have the property of turning the polarized rays to the right, and others, to the left. Practical use is made of this peculiarity, in detecting adulteration in sugar and some other substances, since sugar and the substances used to adulterate it turn the rays in different directions.

Pole, the name given to either extremity of the axis round which the earth revolves. The northern one is called the *north pole*, and the southern, the *south pole*. Each of these poles is 90° distant from every part of the equator. In astronomy, the name is given to each of the two points in which the axis of the earth is supposed to meet the sphere of the heavens, forming the fixed point about which the stars appear to revolve. In a wider sense a pole is a point on the surface of any sphere, equally distant from every point of the circumference of a great circle of the sphere; or a point 90° distant from the plane of the great circle, in a line passing perpendicularly through the center, called the axis. Thus, the zenith and the nadir are the *poles* of the horizon. So the *poles* of the ecliptic are two points of the sphere whose distance from the poles of the world is equal to the obliquity of the ecliptic, or they are 90° distant from every part of the ecliptic. *Pole*, in physics, is one of the points of a body at which its attractive or repulsive energy is concentrated, as the poles of a magnet, the north pole of a needle, the poles of a battery.

The *magnetic poles* of the earth are the points at which a magnetic needle varies 90° from a horizontal position, that is, stands vertical. It is not certain that this pole is positively stationary. The most recent observations concerning the north magnetic pole were made by Captain Amundsen in 1906. He placed it in the near neighborhood of latitude 70° north, and longitude 100° west. See DIPPING NEEDLE.

Polecat, a name given to several species of the weasel family. The common polecat is found in most parts of Europe. It is about seventeen inches long, with coarse brown fur, which grows blackish on the feet and tail. A superior kind of artists' brushes is made from the hairs. The polecat possesses an odor something like that of the American skunk, and hence in the United States the skunk is often called the polecat. It is very destructive to poultry, rabbits and game.

POLECAT

Pole Star or **North Star,** the star of the constellation Ursa Minor, situated about 1° 20′ from the north celestial pole, round which it thus describes a small circle. It is of the second magnitude and is of great use to navigators in the northern hemisphere. Two stars, called the pointers, in the constellation Ursa Major (the Great Bear or Big Dipper) always point in the direction of the pole star, which is thus readily located. See BEAR, GREAT.

Pole Vault. See ATHLETICS.

Police, *po lees'*, the system instituted by a community to maintain public order, liberty and the security of life and property. The primary object of the police system is the prevention of crime and the pursuit of offenders; but it also serves other purposes, such as the suppression of mendicancy, the preservation of order, the removal of obstructions and nuisances and the enforcing of those local and general laws which relate to the public health, order, safety and comfort. The term is also applied to the body of men by which the laws and regulations are enforced.

A police force may be either open or secret. An *open* police includes officers dressed in their accustomed uniform, and known to everybody; a *secret* police is composed of officers whom it may be difficult or impossible to distinguish from ordinary citizens. This latter class of officer is termed, in America and Great Britain, a *detective*.

In the United States each city has a separate police administration. The organization of a uniformed municipal police is comparatively recent; in New York it was not substituted for the inefficient night watch until 1845. The present police organization of that city may be taken as representative of the American system generally. The city, with an area of 309 square miles and a population of about 4,000,000, is divided into inspection districts, which are subdivided into precincts. At the head of the force is a superintendent, or commissioner, under whom there are district inspectors, a captain over each precinct, sergeants, roundsmen (visiting officers), patrolmen (the body of the force) and doormen at the stations. There are also twenty-three police surgeons. The general administration of the force is vested in the commissioner of police, who makes appointments from a list furnished by the civil service commission, transfers, hears charges against members of the force and makes rules and regulations for the discipline of the department. The captains report every morning to the central office. The roundsmen must see that the patrolmen are properly performing their duty, and the sergeants again are responsible for both roundsmen and patrolmen. Besides the general force, there are several "squads" organized for special duties. These include the "sanitary police company," whose members inspect buildings, premises and employments which are supposed to be dangerous to life or detrimental to health, report nuisances and seize food unfit for consumption; officers of this company also act as school-board officers, and others, qualified as engineers, inspect steamboats and stationary steam boilers used for motive power in the city. The detective force is also a separate "squad," as are also the mounted squad for duty near Central Park, the mounted patrol for rural precincts, the harbor police, the "ordinance squad" (for enforcing city ordinances), the Broadway squad (for aiding pedestrians in crossing during the day), special service squads and others. In 1905 the police force of New York numbered more than 8700 men; the average annual cost of the force is about $10,000,000.

Polillo, *po le'lyo,* one of the Philippine Islands. See PHILIPPINE ISLANDS.

Polit'ical Econ'omy or **E'conom'ics,** the science which has as its aim the investigation of the production, distribution, exchange and consumption of wealth, that is, of all articles or products possessing an exchange value. From earliest times there have been controversies over the exact scope and definition of this science. Owing to the conditions under which the production and regulation of wealth must be carried on, the science which investigates this subject is of necessity closely related to all other fields of scientific inquiry and is with difficulty separated from the consideration of physical, intellectual and moral conditions and problems. This fact has led some scholars to declare that political economy has no place as an independent science. For the reason, however, that it involves the systematic statement of a particular class of facts and the drawing of conclusions from them, it is now generally agreed that it may fairly lay claim to consideration as a special science.

SCOPE. Controversies as to the exact nature, and, therefore, as to the definition, of political economy as a science have centered about two important questions, namely, its content or scope, and the method to be employed in its study. As to its scope, there are four clearly defined divisions of the science, considered in its broadest sense: (1) The accumulation, definition, description and classification of economic facts. (2) The investigation and analysis of these facts, in order to determine relations of cause and effect between them, leading to the formulation of so-called economic laws. (3) The determination of the proper aims and ideals of economic progress, judging from the laws which have been evolved. This phase of the subject is evidently closely allied to ethics, or the question of right and wrong. (4) The consideration of the methods or means of attaining these ideals. This involves the investigation of political facts and policies with relation to economic questions, and it may therefore be called *practical*, or *applied, economics*. As the subject is viewed by modern students, it includes all of these phases; but in the past, different schools of economists have arisen and flourished, laying emphasis upon each one of these four branches, and it is only within a half-century that the two last-named branches of the subject have been generally admitted as a part of the field of political economy.

METHOD OF INVESTIGATION. An equally bitter contest has raged over the question of method, and advocates of the deductive method, of the inductive method and of special combinations of the two methods have been numerous. Those who cling to the deductive method have adopted certain postulates, from which they reason in a perfectly abstract manner to certain conclusions, which they then verify by observation of economic facts. The postulates which they accept were, however, originally the result of inductive reasoning, such as the following: That the average man desires more wealth and wishes to gain it by the least possible exertion. From such principles as this, they build up a system of reasoning, which, if their premises were correct, would apply to a community in which competition was perfectly free. The chief defect of this system lies in its disregard of historical development and of existing conditions, which have so modified the operation of the laws which they have deduced, that these laws are of little practical use in explaining economic facts. Another class of economists has held that the only basis for the formulation of economic laws was in the observation of an infinite number of concrete facts, under such conditions that the exact cause and the exact relation in a certain place and time of a certain class of facts could be determined. In the examination of facts they adopted two means, one known as the *method of difference*, and the other, as the *method of agreement*. In using the former, sets of conditions are devised or created in which all circumstances are exactly the same, except those related to one factor; by comparing the operation of this factor in the two cases, its exact effect can be seen. In using the method of agreement, sets of conditions are created which are wholly different, with the exception of two factors whose relations are to be studied. The chief defect of the inductive method, whether by means of comparison of differences or of agreements, lies in the fact that it is almost impossible to control every condition in a complex society, and unless every condition is accounted for, the results of the experiment are nearly valueless. Among those who have used the inductive method solely is a class of scholars to whom historical facts seem so important as a basis for formulating general laws that they have declared that we do not possess sufficient historical information from which to generalize as to the action of economic forces. Therefore, they hold, much of economic science as expounded to-day is of no value.

It is evident from what has been said above that though each of these methods of reasoning has its place in the science of political economy, neither is sufficient in itself to establish a logical and complete system of laws. Modern economists therefore have resorted almost invariably to a combination of the two methods. Their systems are based upon deduction, to the extent that they take from other branches of science established principles. For instance, from chemistry they accept the truth that after a given point of cultivation has been reached, equal applications of labor to the soil do not produce proportionate returns. From physiology they take the principle that man's physical hunger must be satisfied; from psychology, that he will attempt to satisfy this hunger with the least possible exertion. These principles they apply to the explanation of economic facts, and by comparison, in accordance with the inductive method, they disclose certain effects under certain conditions; these effects, after being studied under sufficiently various circumstances, are formulated into laws. Obviously, in the use of such a method, the study of economic facts from the historical standpoint is a necessity, but it is not more important than the investigation of present conditions. In both of these fields the statistical method must be constantly used, to bring the facts of each class together.

CONTENT, OR ELEMENTS. The science of political economy in its broadest sense includes, as the definition indicates, four general heads: (1) The investigation of *production*, including all the factors of production, namely, *land* (all natural agents), *labor* and *capital*; the law of fertility of land (the law of diminishing returns); the laws of the growth of population; the development of capital; the organization of industry, including transportation. (2) The pure theory of *value*, that is, of value as it would arise in a market where competition was absolutely free. This includes discussion of the relation of value and utility; of supply and demand; of cost of production; of the law of rent and the relation of rent to value; of the distribution of the product among the factors of production—land, labor and capital. (3) The *application* of this theory of value to the actual conditions of trade, including consideration of the medium of exchange; the principles governing the purchasing power of money, as well as the influence of credit transactions; the relation of legal and social customs, monopolies, trade unions, co-operation, socialism, upon the production and distribution of wealth. (4) The economic functions and influences of government, including the question of taxation, direct and indirect, and government interference in economic affairs, and involving such questions as tariff and subsidy.

HISTORY. Political economy, as a separate science, is scarcely a century old. However, every people within historic times has been compelled to consider economic problems, and to a greater or less extent has formulated economic theories. Among the Greeks, Plato, Xenophon and Aristotle stand out as the principal contributors to the subject, but their consideration was confined almost wholly to the relation of the State to economic forces. The Romans made little advance, but accepted almost intact the Greek theory, with only such modifications as the different aims of the Roman State made necessary. From the fall of Rome to the latter part of the Middle Ages, there was little discussion of economic questions, but in the thirteenth century the development of the burgher class and the growth in independence of the towns led to an increasing extent and complexity of industry and commerce, which required the formulation of fairly definite policies. From time to time these were expressed in the writings of the period, among the questions considered being the nature and functions of money, institutions of credit and the legitimacy of interest. In the sixteenth century, chiefly through the work of French and English writers, there was developed the famous *mercantile system* of political economy, which was directed toward the development not only of a strong central political State, but of an economic State as well, and thus taught that commerce and industry should be closely regulated, in order that the industry of every country should contribute benefits to that country alone. A little later there was a general reaction toward free trade, which found its expression in a number of different theories of trade, among which was that ot the physiocrats of France, whose motto was to allow each man to labor for his own interests, in his own way, without the slightest government restriction. This theory was greatly developed and popularized by Adam Smith, and from his epoch-making *Wealth of Nations* dates practically the whole modern science of political economy. After the time of Smith new elements of the science were introduced by Malthus, who declared that population tended always to outrun subsistence; by Ricardo, who enunciated the modern theory of rent, and by a host of other men, among them, Torrens, James Mill, McCulloch, Senior, John Stuart Mill, Cairnes and Marshall. Of the most recent school, Jevons, an advocate of the statistical method; Karl Marx, the socialist; Roscher, a German economist who urged the historical method, have all made important contributions; while many contemporary American scholars have had much influence in defining the field of political economy and in establishing certain important principles. Among these men were H. C. Carey, who is best known, perhaps, for his earnest defense of the policy of protection in a period when the general tendency was toward free trade; Francis A. Walker; Henry George, who attempted to reorganize political economy with Ricardo's law of rent as its underlying principle, and Richard T. Ely, who has devoted himself particularly to the consideration of the economic functions of government. See VALUE; CAPITAL; INTEREST; RENT; WAGES, and allied topics.

Political Offenses, those offenses considered injurious to the safety of the state, or such crimes as form a violation of the allegiance due by a subject to the recognized supreme authority of his country. The most serious political offense is termed *treason,* and those of a lighter nature, which do not aim at open violence against the laws, but which excite a discontented spirit which would likely produce violence, are termed *sedition.* Extradition treaties usually do not compel the giving up of political offenders.

Political Parties in the United States. During the colonial period of American history, political parties as such did not exist, since the issues which divided the people centered almost wholly in the relations of the colonial governments with the mother country, and upon these there was at first little difference of opinion among the colonists themselves. After 1760, with the development of a more rigid colonial policy on the part of England, two factions arose in America, one favoring the steps taken by the home government to compel obedience to its decrees, the other opposing this obedience and favoring a constantly increasing degree of self-government. With the approach of open conflict, the American, or patriot, party began to call themselves *Colonial Whigs,* because of the gratitude which they felt for the work of the English Whigs in their behalf. Accordingly, those who opposed the demands of the patriots were known as *Tories.* In the course of the

Revolution, through active measures taken by the patriots, the Tories began to leave the country in large numbers, and at its close the people were almost united in their loyalty to the new American nation.

Meanwhile, the Articles of Confederation had been framed and the new government had been organized; but from the beginning a difference of opinion was manifest regarding the constitution of this new government. One party, consisting largely of those who lived in rural districts, together with the debtor and professional classes, favored a loose confederacy, in which the separate states retained most of the powers of sovereignty, delegating to the central government only such rights and powers as concerned all of the states. Another party, which constantly increased in size after the adoption of the Articles, owing to the manifest weakness and inefficiency of the government, demanded the establishment in the central government of all the essential powers of sovereignty, making it a government having jurisdiction over the people of the country rather than over the states, and leaving to the states themselves only the powers of local government. The latter party gained such strength that a convention was finally called to revise the Articles of Confederation, and in this convention the two parties fought out their differences and by a system of compromises produced a new Constitution. In most respects, however, the strong central government party, known in the convention as *Nationalists* and after its conclusion as *Federalists*, gained their points, and the Constitution, as it went before the people for ratification, though satisfactory to neither party, vested far more powers in the central government than did the old Articles of Confederation. After bitter contest throughout the country the Constitution was adopted by the requisite number of states and went into operation, and the Federalist party, in the persons of Washington, Hamilton, Jay, John Adams and others, was first raised to power.

The first real party organization developed soon after, in opposition to the financial measures introduced by Alexander Hamilton, which included payment of the debt of the old Confederation, payment of the debts owing by the states as a result of the Revolution, and establishment of a national bank. All the measures passed, and for the next twelve years the Federalist party maintained control of the government. During that time, however, owing to the well-known spirit and intentions of some of Washington's advisers, and in spite of his own declarations, there was a growing feeling that the Federalists aimed to make the government eventually monarchical in form. This, coupled with the sympathy among a large number of people for the advanced democratic ideas finding expression in the French Revolution, together with certain acts passed under the Federalist administration disclosing a distrust of the people, led to the overthrow of the party in 1801 and the election of an *Anti-Federalist* president, Thomas Jefferson.

Thereafter, for twenty-five years, the Anti-Federalist party remained in power, changing its name under various circumstances, first to *Republican*, then to *Democratic-Republican* and finally, to *Democratic*. During this period, however, a change occurred in the general policy of the Anti-Federalist party. Whereas it had come into power as the party of the strict construction of the Constitution, circumstances compelled it to disregard its old principles at times and to interpret the Constitution more liberally than the Federalists ever had done, as in the expansion of territory by the Louisiana Purchase and in the Embargo and Non-Intercourse acts. The War of 1812, which was brought about through diplomatic blunders and general lack of broad foreign policy, might have been turned to the advantage of the Federalists had they not lacked efficient leaders, but it proved to be their downfall. The Hartford Convention, which met in 1814 and was composed of New England Federalists, went so far in condemning the policy of the government as to lay its members open to the charge of disloyalty, and the little respect which had been retained for the Federalists rapidly disappeared.

In 1817 the Federalists nominated Rufus King of New York for president, and the Republicans nominated James Monroe. The election resulted in 183 electoral votes for Monroe and 34 for King. Though Monroe's administration is known as the "Era of Good Feeling," in reality party dissension continued throughout this period and in fact became so bitter over the questions of tariff, internal improvements and the interpretation of the Constitution, that a large faction of the Republican party broke away from its allegiance and formed a new party, known as the National Republican, led by John Quincy Adams and Henry Clay. Many of the old Federalists supported the new party, and its candidate, Adams, was elected in 1824 over Andrew Jackson, the Republican candidate. However, the growing demand for a "people's president," which was expressed in the popular candidacy of Jackson, grew to such proportions that the National Republicans were swept out of office, and Jackson was chosen president. The Republicans, now known as Democrats, had already adopted, in part, at least, many of the principles of the National Republicans, and internal improvement and protection remained the policy of the government.

In 1832, for the first time, the parties nominated their candidates for president by national conventions, all of which were held at Baltimore. In this election the *Anti-Masonic* party, opposed to the influence of secret societies in elections, also appeared, but it polled only seven electoral votes. During Jackson's second administration (1833–1837), the hold of the Democrats upon the government was decidedly weakened through Jackson's open opposition to the national bank, which had become an important part of the fiscal system of the country. However, in 1836, the Democratic candidate, Martin Van Buren of New York, was chosen president. Meantime, the old National Republicans had changed the name of their party to the *Whig* party, and, joined by the Anti-Masons, they supported William H. Harrison, of Ohio, for president. Throughout this administration the influence of the Democrats was constantly weakened, Congress was almost evenly divided between Whigs and Democrats, and the administration was constantly harassed by its inability to secure the passage of its measures. Meantime, the anti-slavery forces had united and formed the *Liberty* party, and in 1840 they chose James G. Birney as their candidate. The Whigs, including many Southern Democrats who had become alienated from their party by Jackson's and Van Buren's attitude toward slavery, protection and other issues, united upon William Henry Harrison; the Democrats nominated Van Buren. Harrison was victorious after a memorable campaign, but he died shortly after and was succeeded by the vice-president, John Tyler, a former Southern Democrat, opposed, on general principles, to the party of which he was now the representative.

In 1843 Clay was the candidate of the Whigs, Birney was again chosen to represent the Liberty party, and James K. Polk was the candidate of the Democratic party. Polk was elected by a small popular and electoral majority, the paramount issue being the annexation of Texas. This was accomplished only after the Mexican War, which tended still further to divide both parties upon sectional lines. In 1848 Zachary Taylor, the Whig candidate, was chosen over Lewis Cass, the Democratic nominee, and Martin Van Buren, the nominee of the *Free-Soilers*, who now had absorbed the old Liberty party and many Northern Democrats and Whigs, who found the wavering slavery policy of the two old parties objectionable. During the succeeding administration the slavery question constantly recurred in various forms, relating to the admission of new states, the power of Congress to restrict slavery in the territories, and the obligation of free states to return fugitive slaves to their owners. The most important event of the period was doubtless the passage of the Compromise of 1850 and the Fugitive Slave Law, which seemed for a time to settle the slavery question. President Taylor died July 9, 1850, and was succeeded by Millard Fillmore, an Anti-Slavery Whig. In 1852 the Democrats nominated Franklin Pierce of New Hampshire, endorsed the compromise measures of 1850 and urged the suppression of agitation regarding slavery. The Whigs nominated Winfield Scott, who also endorsed the slavery compromises, but in cautious terms. The Free-Soilers denounced all compromise with slavery and nominated John P. Hale of New Hampshire. Twenty-three out of twenty-seven states chose Democratic electors.

During Pierce's administration the slavery question again came to the front, in the discussion of the Kansas-Nebraska Bill, which divided both parties; the Southern Democrats and Southern Whigs united in favor of the bill, which practically took from Congress the power to regulate slavery in the territories, while the Northern Democrats were evenly divided concerning it, and the Northern Whigs and Free-Soilers were united against it. The Democratic party re-united after this contest, but the Whigs were permanently divided, and soon after, the name disappeared from politics. Meantime, a new party had arisen, officially called the *American* party, but popularly known as the "Know-Nothings." Its candidate in 1856 was Millard Fillmore. The Democrats nominated James Buchanan. A second new party, consisting chiefly of the opponents of the Kansas-Nebraska Bill, but including a number of the different factions favoring the loose construction of the Constitution and the principle that the

Federal government can control slavery in the territories, appeared. It was known as the *Republican* party, and its candidate was John C. Fremont. Before this election the Democrats, through President Pierce, had taken a firm position against the power of the Federal government to control slavery in the territories. By means of a practically solid Southern vote against a divided Northern vote, Buchanan was elected.

The slavery question moved rapidly forward to a crisis during Buchanan's administration. The Dred Scott Decision, practically opening all United States territory to slavery, aroused the North to a realization that the slave power must immediately be arrested, if it were not to gain complete control of the government. Consequently, in 1860 the Republican candidate, Abraham Lincoln, of Illinois, received the support of many Northern Democrats and of practically all the opponents of slavery. The Democrats came to an open division at this time, one wing, consisting of the radical Southern element, demanding a radical declaration in favor of slavery, another wing favoring the regulation of slavery by the people of the territories themselves and, above all, the maintenance of the Union. The Southerners nominated John C. Breckenridge; the Northerners, Stephen A. Douglas. The American, or Know-Nothing, party, changing its title to the *Constitutional Union* party, nominated John Bell, of Tennessee, upon a platform which completely evaded the slavery issue. The election resulted in favor of the Republicans, and immediately several of the Southern states seceded.

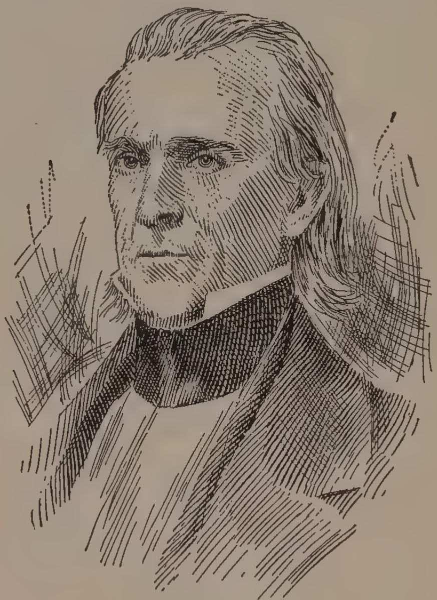
The Civil War was the outcome, and for four years the government, though nominally in the hands of the Republicans, was in reality supported by a party calling itself the *Union* party, consisting entirely of Northerners, both so-called "War Democrats" and Republicans. However, by 1864 a sufficient number of the Democratic supporters of the administration had become estranged to make a serious opposition in the national election, upon the assertion that the war was a failure. Its candidate was George B. McClellan, of New Jersey, a popular general. Lincoln was again nominated as the Republican candidate, and a convention of radical Republicans, who demanded more harsh treatment toward the rebellion, nominated John C. Fremont, of California. Lincoln, however, was reëlected. On the death of President Lincoln, April 14, 1865, just as the war was coming to a close, Andrew Johnson, of Tennessee, a War Democrat, became president, and during the next four years all parties suffered the severest strain. Johnson immediately disclosed his disapproval of the reconstruction policy of Congress and, as a result of his fierce and tactless opposition, he was impeached, being saved from conviction by only one vote. However, the Democrats, who had approved his course, refused to support him in 1868, nominating Horatio Seymour, of New York, against the popular Republican candidate, General U. S. Grant.

Grant gained an overwhelming victory and furthered the Republican policy as outlined by Congress. During his two administrations, however, the opposition to the radical reconstruction policy gained strength and found expression in the *Liberal Republican* party, which, at its convention in May, 1872, nominated Horace Greeley, of New York, a former Republican. Grant was renominated by the Republican party, and, though the majority of the Democrats endorsed the Liberal Republican nomination, a few refused to follow and nominated Charles O'Conor. For the first time, also, the temperance party presented a candidate for president. Before the electoral votes were counted, Greeley was dead, and Grant received an overwhelming majority, only scattering votes being cast for the other candidates. During the second administration of President Grant, charges of corruption, involving many high officials, led to a serious rupture in the Republican ranks, and in 1876 the Democratic candidate, Samuel J. Tilden, gained a majority of the popular vote, though his Republican opponent, R. B. Hayes, was chosen by an electoral commission, to whom were referred the returns from a number of disputed states. At the same time Peter Cooper was candidate for president on the *Greenback*, or *National*, party ticket, put forward by a coalition of elements who favored an unlimited issue of paper currency, and Greene C. Smith was the *Prohibition* candidate.

Reconstruction was completed under Hayes, and the corruption which had been disclosed under his predecessor was so vigorously dealt with that the Republicans made decided gains in popular esteem. Their candidate, James A. Garfield, was elected in 1880 by a small plurality over Hancock, the Democratic nominee, and James B. Weaver, the Greenback candidate. Garfield was assassinated early in the following year and was succeeded by Chester A. Arthur. During his administration the tariff controversy, which had been constantly assuming greater importance since the Civil War, became the paramount issue, and the Democratic candidate, Grover Cleveland, was elected in 1884, over James G. Blaine, Republican; John P. Saint John, Prohibitionist, and Benjamin F. Butler, *Laborite,* the candidate of the old Greenback faction and of organized labor. Another influence which was important in this campaign was the demand for civil service reform. The Houses of Congress being controlled by opposite parties during this administration, little was accomplished by the party in power along the lines indicated by the campaign, and in 1888 the Democrats were turned out, Benjamin Harrison, the Republican candidate, being elected over Cleveland, Democrat; Fiske, Prohibitionist, and Streeter, the candidate of union labor. The McKinley tariff, which was passed in 1890, and the Sherman silver law of the same year, proved unpopular, and as a result of a wide-spread educational campaign on the part of the Democrats, Cleveland was again elected president in 1892. In this year appeared for the first time the *People's* party, which was a coalition of all the former labor and greenback factions; its candidate received more than a million popular votes and the electoral votes of six states. The *Socialists* also nominated a candidate, Simon Wing; the Prohibitionists nominated John Bidwell, and the Republicans, Benjamin Harrison.

In 1896 the so-called radicals gained control of the Democratic organization, repudiated the policy of the administration regarding the fiscal and monetary management of the government, and declared for the free coinage of silver at the ratio of sixteen to one. They nominated William J. Bryan, of Nebraska, for president. The Republicans nominated William McKinley, of Ohio, author of the McKinley Bill, on a platform which declared for higher tariff and for the gold standard of coinage. The People's party endorsed the Democratic nomination. The Prohibitionists in this campaign were divided, one faction standing for the single principle of prohibition, another declaring for free silver, woman suffrage and other principles of the People's party, then known as *Populists.* A number of Democrats, dissatisfied with the action of the Democratic convention, met at Indianapolis and nominated so-called *National Democratic* candidates, John M. Palmer, of Illinois, for president, and Simon B. Buckner, of Kentucky, for vice-president. The socialists nominated Charles B. Matchett, under the title of the *Socialist-Labor* party. McKinley was elected, and during the following administration the return of prosperity to the people and the successful prosecution of the Spanish-American War re-entrenched the Republicans in power, so that in 1900, when the question of the retention of the Philippine Islands was made the paramount issue, McKinley was reëlected by a large majority. He was assassinated in 1901, and Theodore Roosevelt became president. Following out President McKinley's policy and announcing a firm and far-reaching foreign policy, in the execution of which he had remarkable success, he gained the support of many former Democrats and was triumphantly reelected in 1904 by an unprecedented majority. See UNITED STATES, subhead *History,* and articles on the separate parties.

Polk, *poke,* JAMES KNOX (1795–1849), an American statesman, eleventh president of the United States, born in Mecklenburg County, N. C. He graduated at the state university, studied law, and was admitted to the bar in 1820. He was soon elected to the legislature and in 1825 entered Congress as a Democrat. There he served as speaker during two terms, winning distinction by his industry and ability. He



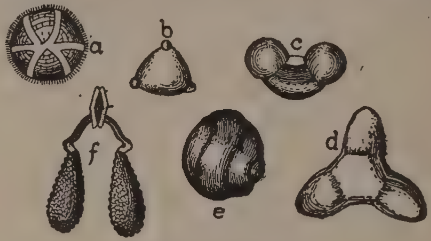
JAMES KNOX POLK

was an ardent supporter of President Jackson and of Van Buren. He remained in Congress until 1839, when he was elected governor of Tennessee, but he was later twice defeated.

In 1844, however, Polk secured the Democratic nomination for the presidency, as a compromise candidate, and after a memorable campaign against the Whig nominee, Henry Clay, he was elected, through his earnest advocacy of the party platform, which demanded the "reoccupation of Oregon and the reannexation of Texas." He was carried into office partly by the famous cry of "54, 40 or fight," which referred to the popular demand for the possession of all of Oregon as far as 54° 40′ north latitude; but the administration was wisely content with a compromise solution of the boundary question and thus avoided a war with Great Britain. Meantime, the boundary of Texas had caused a serious dispute with Mexico, which precipitated a war in 1846. It was conducted with vigor by the administration and resulted in the acquisition of large territory (See Mexican War). During Polk's administration the low Walker tariff was also passed, and the independent treasury system, advocated by Van Buren, was established. A debate over the Wilmot Proviso, which also occurred during his term, marked an important step in the slavery controversy.

Polk, Leonidas (1806–1864), an American soldier, born at Raleigh, N. C., and educated at the state university and at West Point. He resigned from the army, entered the Episcopal ministry and in 1841 became the first Protestant Episcopal bishop of Louisiana. In this position he exerted his influence for the establishment of facilities for higher education in the South, which resulted in the establishment of Suwanee University in 1858. At the outbreak of the Civil War, he was appointed, on account of his thorough knowledge of the Southern states, major general in the Confederate service, with command of the defense of Tennessee and Missouri. He fought at Belmont, Shiloh, Perryville, Murfreesboro and Chickamauga, having been meantime commissioned lieutenant general. As a result of charges by General Bragg, he was temporarily suspended, but was reinstated, though he declined again to enter the active service. He was killed at Marietta, during Sherman's campaign toward Atlanta.

Pol′len, the cells formed in the anthers of flowers, which, when carried to the stigma of another blossom of the same species, cause the ovules to develop into seeds. Pollen grains are minute, yellowish bodies, which vary greatly in size, shape and markings, according to the methods by which they are carried from stamen to pistil. Some are so exceedingly minute that they are carried easily by the wind, and others are covered with a sticky substance that makes them cling to anything touching them. Some are spherical; others elongated or angular. They may be smooth or they may be covered with knobs or spines; but whatever the shape or appearance, they are always the same in the same plant. When a pollen grain has been carried to the stigma of a plant, it develops delicate tubes, which find their way down through the style to one of the ovules. Where the style is very long, several days may be required for the tubes to penetrate to the ovule, but as soon as it has been reached, the ovule begins to divide and grows rapidly into an embryo, around which form walls that ripen into a mature seed. Only one pollen grain is necessary for the fertilizing of any ovule, but so great are the chances for destruction that every plant produces many more pollen grains than it is possible should live.



POLLEN

a, gourd; *b*, enchanter's nightshade; *c*, pine; *d*, evening primrose; *e*, musk plant; *f*, milkweed.

Poll, *pole*, **Tax,** a tax levied "by the head," that is, at a certain amount for each person, citizen or voter within the state. In most states of the Union, it is $1, but it varies from $0.50 to $3.00, and in some states it is prohibited by constitution or by law.

Po′lo, a ball game, played on the same general principles as hockey, but in which the contestants are mounted on ponies. They drive the ball forward and backward by means of a mallet, or stick with a cigar-shaped head eight or nine inches long and two inches thick and with a crook at the end. These mallets are about four feet four inches long. Since the ponies are ridden at full speed and since there are eight men trying to drive the ball between the goals at opposite ends of the field, the game may be a very rough one. Yet it is exceedingly popular, both in England and America, especially among the wealthy. In fact, it cannot be a poor man's game, on account of the expense of keeping the ponies. Good polo ponies are very expensive, for they must be quick, strong, active and thoroughly trained; in fact, a good horse takes as much interest in the game as his master and follows the ball with almost as great skill. Sometimes the ponies are seriously injured, and no one animal is expected to last out a game; in fact, the riders change their horses at the end of each period. See WATER POLO.

Polo, MARCO (about 1250–1324), a Venetian traveler, born of noble family. Shortly before his birth, his father, Niccolo, and his uncle, Maffeo, set out on a mercantile expedition and ultimately arrived in China, where they were favorably received by Kublai Khan, the grand khan of the Mongols. In 1266 the khan sent the brothers on a mission to the pope, and they arrived in Venice in 1269. Two years later they again set out for the East, this time accompanied by the young Marco. After reaching the court of Kublai, Marco rapidly learned the language and customs of the Mongols and became a favorite with the khan, who employed him on various missions to the neighboring princes. Soon afterward he was made governor of a province in Eastern China, an appointment he held for three years. In 1292 the three Polos accompanied an escort of a Mongolian princess to Persia. Learning of Kublai's death, they resolved to return home, and they reached Venice in 1295. In the following year Marco Polo took part in a naval battle against Genoa, in which he was taken prisoner. During his captivity he dictated to a fellow prisoner an account of all his travels, which was finished in 1298. After his liberation he returned to Venice, where he died. *The Book of Marco Polo* created an immense sensation among the scholars of the time and was regarded by many as pure fiction. It made known to Europeans the existence of many nations of which they were formerly totally ignorant and created a passion for voyages of discovery.

Polyb'ius (about 205–120 B. C.), a Greek historian, born at Megalopolis, in Arcadia. Educated for arms and political life, he entered, at the age of twenty-four years, into the military and political service of the Achaean League. After the subjugation of Perseus, king of Macedonia, by the Romans, Polybius found himself among the one thousand Achaeans summoned to Rome to explain why the League had not aided the Roman army in Macedonia. While in Italy he formed an intimate friendship with Scipio Aemilianus, and he accompanied him to Africa, where he witnessed the destruction of Carthage. He returned to Greece in 146, just after the fall of Corinth, and exerted himself successfully toward obtaining moderate terms from the Romans for his countrymen, who had again been defeated in the struggle with Rome. His principal work is his history of Rome.

Pol'ycarp, a celebrated early Christian martyr, born, according to his testimony, about 69 A. D., of Christian parents. He was taught by the Apostle John and was acquainted with many that had seen Jesus. Polycarp was bishop of Smyrna and late in life went to Rome, where he disputed with the bishop about the time for commemorating the Passion. This preaching won many from their heresies. He returned to Smyrna, where he was among those who suffered martyrdom. Being offered his life if he would revile Christ, he said, "Fourscore and six years have I been His servant, and He hath done me no wrong. How then can I blaspheme my King who hath saved me?" The *Epistle to the Philippians* is the only one of Polycarp's writings that is extant. No other work of the time contains so many New Testament phrases.

Polycrates, *po lik'ra teez,* a tyrant of Samos, who flourished about 520 B. C. So remarkable were his successes that he was known as the "darling of the gods." According to legend, at one time he attempted to make an alliance with the Egyptian king, who warned him that to prevent envy on the part of the gods, he should sacrifice his most valued possession. Accordingly he threw into the sea a most valuable ring, which, on the following day, was found in the mouth of a fish which was served on his table. The king of Egypt, learning that the sacrifice of Polycrates was refused by the gods, declined the alliance, and a few days later Polycrates was put to death by a satrap of Persia.

Polyg'amy consists in a man's having more than one wife at the same time. In ancient times polygamy was practiced by all the Eastern nations and was sanctioned, or at least tolerated, by their religions. It was permitted to some extent among the Greeks, but later it entirely disappeared among them. The ancient Romans and Germanic races practiced it but rarely. The institution still exists among the Mohammedans and among the Mormons, but it is not tolerated by other civilized peoples or by any other modern religions. Perhaps the most common form of polygamy is *bigamy*, in which a man has two wives.

Pol′ygon, a portion of a plane, completely enclosed by straight lines. Polygons are called triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons, nonagons, decagons, etc., according as they have three, four, five, six, seven, eight, nine, ten sides, etc. A polygon is said to be regular when it is equilateral and equiangular. It is convex when none of its sides, if extended, would cut any other of its sides. It is concave when one or more of its sides, if extended, would cut others of its sides. It is cross when its boundary line crosses itself. The area of a regular polygon is equal to the sum of its sides multiplied by one-half the perpendicular distance from the center to any side. See QUADRILATERAL.

Pol′yhym′nia or **Polymnia,** among the Greeks, the muse of the pantomime. She usually was represented in art as covered with a white mantle, without any attribute.

Polymerism, *po lim′ur iz′m.* Sometimes compounds belonging to the same family have molecules composed of the same elements, which are present in the same proportion, but as they do not contain the same actual numbers of various atoms, they differ in molecular weight. This phenomenon is called polymerism, and the substances are said to be polymers of one another. See ALLOTROPY.

Polynesia, *pol i ne′she a,* a general name, formerly given to a number of distinct archipelagoes of small islands scattered over the Pacific Ocean, the Philippines, New Guinea, Australia and New Zealand being excluded. The islands are distributed into numerous groups, with a general direction from northwest to southeast. The term Polynesia is now generally restricted to the groups most centrally situated in the Pacific, comprising those islands not included in Melanesia and Micronesia. The islands may be divided into two chief classes, volcanic and coral islands. Polynesia has a comparatively moderate temperature, and the climate is delightful and healthful. The predominating race, occupying the central and eastern portion of Polynesia, is of Malay origin, with oval faces, wide nostrils and large ears. The other leading race is of negroid or Papuan origin, with negro-like features and crisp, mop-like hair. Christianity has been introduced into a great many of the islands, and a large number of them are under the control of one or other of the European powers.

Pol′yp, a name now generally given to those animals which are attached to some solid foundation and which usually live in large colonies, secreting a common stock of jelly-like, horny or limy formation, in the cavities of which they reside. See CORAL; COELENTERATA.

Polyphemus, *pol i fe′mus,* in Greek mythology, the most famous of the Cyclopes. He was a giant, with one eye in the middle of his forehead, and he lived with his brother Cyclopes on an island, where all day he fed his flock, retiring at night to a cave by himself. During their voyage from Troy to Greece, Ulysses and his companions were cast ashore on this island and took refuge in the cave of Polyphemus. When the giant returned and discovered them, he rolled a huge stone before the door so they could not escape, and at once devoured two of Ulysses's companions. In the morning before taking his departure he ate two more. As he rolled the stone before the door when he left the cave, Ulysses and his companions were obliged to remain shut up all day, but during this time they sharpened and hardened with fire a large stick, which they hid. After supper that night Ulysses contrived to make Polyphemus drunk, and while he was in a drunken slumber, Ulysses with his companions, heated in the fire the sharpened stake and plunged it into the eye of Polyphemus. The giant, maddened with pain, was unable to capture any of the strangers, and when in the morning he drove out his flock, Ulysses and his companions, by fastening themselves under the sheep, were carried out into freedom.

Polytechnic, *pol i tek′nik,* **Schools.** See TECHNICAL EDUCATION; MANUAL TRAINING.

Pol′ytheism, the belief in, and worship of, several gods; opposed to atheism and to monotheism, the belief in, and worship of, one god. It is still a matter of debate whether polytheism is a primary form of human belief or has grown out of an original belief in one god. It is argued, on the one hand, that the sense of personal dependence, the feeling that there was an undefined power, a mysterious *something* around and above him, did not primarily present itself to the mind of man except under a form of unity. His earliest religion would therefore be of a monotheistic character, not very firmly fixed in his mind, and liable, among races of rude faculties and little power of controlling their thought, to assume a polytheistic form, the idea of one

Supreme Being being readily hidden by the many visible operations of that being on earth. Those who affirm that polytheism was a primary form of religious belief argue that man, ignorant of the nature of his own life and of the nature, origin and properties of other objects, could at first only attribute vaguely to all visible things the same kind of conscious existence as that which belonged to himself. Thus, the sun, the moon and the stars would all be living beings; and their influence, from the absence of any idea of a natural order, would be seen in the events that took place in the world and in human life. As being beyond human control and as affecting the condition of men, they would be loved or feared; and with the growth of the idea that they might be persuaded to forgive or to do a kindness, the system of polytheism would be complete.

Pomegranate, *pum'gran ate,* the fruit of a shrub or small tree which grows from eight to twenty feet high and is supposed to have come originally from the north of Africa. The fruit resembles a large apple, but has a tough and leathery skin. It has many seeds, surrounded by a soft pulp, which is more or less acid and is important as an article of food. The Mexicans distill from its juice an acid liquid, which they call aguardiente. The pomegranate is extensively cultivated throughout southern Europe and in the West Indies and Guiana.

Pom'elo. See Grape Fruit.

Pomera'nia, a province of Prussia, bounded by the Baltic Sea, Mecklenburg, Brandenburg and West Prussia. Its area is 11,629 square miles. The coast is low and sandy and is broken by many lagoons. The interior is flat and in parts marshy. The principal river is the Oder, and the chief islands along the coast are Rügen, Usedom and Wollin. Although the soil is in general sandy, there are some rich alluvial tracts, which produce cereals, potatoes, beets and tobacco. Cattle raising is an important industry, and fish are taken in great quantities along the coast. The manufactures, which are not of primary importance, include glass, sugar, tobacco, woolen goods and distilled liquors. A considerable general and transit trade is carried on, and this centers largely in Stettin, the capital of the province.

Pomerania appears to have been inhabited originally by Goths, Vandals and Slavs. The first mention of it in history is about the middle of the twelfth century. It long remained an independent duchy, but in 1637, on the extinction of the ducal family, it was in part annexed to Sweden. In 1720 Prussia gained possession of a large part of the province, and in 1815 the remainder was secured. It is divided for administrative purposes into three governments, Stettin, Stralsund and Köslin. Population in 1900, 1,634,659.

Pomera'nian Dog. See Spitz.

Pomo'na, among the Romans, the goddess of fruit, and the wife of Vertumnus. At Rome she was usually represented with a basket of fruit, or with fruit in her bosom.

Pomona, Cal., a city in Los Angeles co., 33 mi. e. of Los Angeles, on the Atchison, Topeka & Santa Fé and the Southern Pacific railroads. It is a beautiful place in the San Gabriel valley and has become a popular health resort. The cultivation of oranges, lemons, citrons, figs, olives and almonds is extensively carried on. There are manufactories of wine, a canning factory, a planing mill and other establishments. Pomona College is at Claremont, near the city. The municipality has a public library and Ganesha Park, which commands a magnificent view of the surrounding country. It was settled in 1875 and was incorporated in 1887. Population in 1900, 5526.

Pom'pano, a fine food fish, bluish and silvery in color, that lives permanently about the Florida keys and comes north along the Atlantic coast to spawn in the spring. It is about eighteen inches long and is captured in seines, and otherwise. There are a number of other species, elsewhere known as the pompano, among which is the highly prized *harvest fish,* that is found in the waters off southern California.

Pompeii, *pom pa'ye,* an ancient city of Italy, in Campania, near the Bay of Naples, about 12 mi. s. e. of Naples and at the base of Mount Vesuvius, on its southern side. Before the close of the Republic and under the early emperors, Pompeii became a favorite retreat of wealthy Romans. In 63 A. D. a fearful earthquake occurred, which destroyed a great part of the town. The work of rebuilding was soon begun, and the new town had a population of some thirty thousand, when, in 79, occurred the terrible eruption of Vesuvius, which buried the city to a depth of almost twenty feet under a mass of ashes, red-hot pumice stone and cinders.

Pompeii was completely forgotten during the Middle Ages, and it was not until 1748, when a peasant, in sinking a well, discovered a painted chamber, with statues and other objects of antiquity, that anything like a real interest in the locality was excited. Extensive excavations were now carried on, and in 1755 the amphitheater, theater and other parts were cleared out. Under the Bourbons the excavations were carried out on a very unsatisfactory plan. Statues and articles of value alone were extricated, while the buildings were suffered to fall into decay or were covered up again. To the short reign of Murat (1808–1815) we are indebted for the excavation of the Forum, the town walls, the Street of Tombs and many private houses. Latterly the government of Victor Emmanuel assigned $12,500 annually for the prosecution of the excavations, and a regular plan has been adopted, according to which the ruins are systematically explored and carefully preserved.

The town is built in the form of an irregular oval, extending east and west. The circumference of the walls is about two miles, and there are eight gates. The streets are straight and narrow and paved with large blocks of lava. The houses are slightly constructed of concrete or occasionally of bricks. Numerous staircases prove that the houses were of two or three stories. The ground floor of the larger houses was generally occupied by shops. Most of these houses were entered from the street by a narrow passage leading to an interior hall, which provided the surrounding chambers with light and was the center of communication. The other portion of the house comprised the private rooms of the family. All the apartments were small. The chief public buildings are the so-called Temple of Jupiter, the Temple of Venus, the Basilica, the Temple of Mercury, the Gladiators' Barracks and two theaters. There are several interesting private buildings, including the villa of Diomedes, the house of Sallust and the house of Marcus Lucretius. The Museum of Naples owes many of its most interesting features to the ornaments, statues and other movable works of art found in the public and private edifices above mentioned.

Pom'pey, in full, Gnaeus Pompeius Magnus (106–48 B. C.), a distinguished Roman general. In the struggle between Marius and Sulla, Pompey raised three legions to aid the latter and regained all the territories of Africa which had forsaken the interest of Sulla. On his return to Rome, Sulla greeted him with the surname of *Magnus* (Great), and reluctantly consented to the triumph which Pompey demanded. After the death of Sulla, Pompey put an end to the war which the revolt of Sertorius in Spain had occasioned, and completed the subjugation of the forces of Spartacus (See SPARTACUS). In 70 B. C., although not of legal age and without official experience, he was elected consul, with Crassus. In 67 B. C. he cleared the Mediterranean of pirates and destroyed their strongholds on the coast of Cilicia. In 65 he was placed in command of the army sent against Mithridates. He conquered Mithridates, Tigranes and Antiochus, and at the same time he subdued the Jews and took Jerusalem by storm. He returned to Italy in 62 and disbanded his army, but did not enter Rome until the following year, when he was again honored with a triumph.

Pompey, in order to strengthen his position, united his interest with that of Caesar and Crassus, and thus was formed the First Triumvirate. This agreement was concluded by the marriage of Pompey with Caesar's daughter Julia; but the powerful confederacy was soon broken. During Caesar's absence in Gaul, Pompey ingratiated himself with the Senate, was appointed sole consul and had the most important state offices filled with Caesar's enemies. Caesar was proclaimed an enemy to the state, and his rival was appointed general of the army of the Republic. Caesar crossed the Rubicon in 49 B. C. (See CAESAR) and in sixty days he was master of Italy without striking a blow. Pompey crossed over to Greece, and in that country, on the plains of Pharsalia, occurred the decisive battle which made Caesar master of the Roman world. Pompey fled to Egypt, where he hoped to find a safe asylum; but the ministers of Ptolemy betrayed him, and on landing he was stabbed by one of his former centurions.

Pon'ca, a tribe of Siouan indians, who were deported to Oklahoma from Nebraska in 1877. In their new home sickness caused so many deaths that a portion of them returned to Nebraska, though many continued to reside with the Oto and Pawnee tribes.

Ponce de Leon, *pon'tha da la ohn'*, JUAN (1461–1521), one of the early Spanish explorers in America. He accompanied Columbus on his second expedition in 1493 and was commissioned to conquer the island of Porto Rico. Having there amassed great wealth, he set out for a country to the north, where, he had heard, there was a fountain of perpetual youth. He reached Florida in 1513, but failed in his quest. He was appointed governor of the "island" of Florida, on condition that he should colonize it. In 1521 he proceeded to take possession of his province. He was, however, met with hostility by the natives, and in a combat Ponce de Leon was mortally wounded.

Pondicherry, *pon'de sher're,* a town of India, capital of the French possessions there. It is on the east, or Coromandel, coast, 83 mi. s. s. w. of Madras. Its area is 115 square miles. It stands on a sandy beach and consists of two distinct parts, separated by a canal. The European quarter on the east, facing the sea, is regularly laid out about a handsome square and has well-built houses. The native quarter consists of houses, or huts, of brick or earth, besides a few pagodas. The trade of the city is of considerable importance, the chief exports being cotton stuffs, rice, nuts and hides. The town was first settled by the French in 1674. The Dutch gained possession of it about twenty years later, but were soon compelled to restore it to the French. It was, in the century and a quarter that followed, several times taken by the English, but it was finally restored to France in 1815.

Pontchartrain, *pon char trayn',* a lake of Louisiana, 5 mi. n. of New Orleans. It is about 40 miles long and 25 miles wide. It communicates with Lake Borgne, Lake Maurepas and the Mississippi River and bv means of a canal, with New Orleans.

Pon'tiac (1720–1769), the famous chief of the Ottawa indians. For two years, beginning in 1763, Pontiac made war upon the whites, at the head of a great confederacy which he had organized, including most of the tribes west of the Alleghany Mountains and east of the Mississippi. At first the indians were everywhere successful, and only Niagara and Detroit were able to withstand his fierce assaults; but when peace was declared between France and England, Pontiac, deserted by many of his allies, surrendered. Pontiac was murdered by an Illinois indian, who, by this act, destroyed his tribe, for the northern tribes took summary vengeance on every Illinois they could find. Parkman's *Conspiracy of Pontiac* is a fascinating history of the great chief and his remarkable confederacy.

Pontiac, Mich., the county-seat of Oakland co., 26 mi. n. w. of Detroit, on the Clinton River and on the Grand Trunk and the Pontiac, Oxford & Northern railroads. Near the city are several hundred picturesque lakes, which afford good fishing and hunting and have on their shores many hotels, clubhouses and fine summer residences. The surrounding region is agricultural, and the city contains carriage factories, machine shops, a foundry, flour and lumber mills, a knit goods factory, gas engine works and other establishments. There is also a considerable trade in farm produce, fruit, vegetables and wool. The Michigan Military Academy and the Eastern Michigan Asylum for the Insane are located here, and the city has a high school library and the ladies' library, eight churches and four banks. The place was settled about 1818, was named in honor of the famous indian chief Pontiac and was chartered as a city in 1861. Population in 1904, 10,884.

Pon'tifex, among the ancient Romans, a priest who served no particular divinity. The pontiffs, according to tradition, were instituted by Numa, and their number varied at different periods from four to sixteen. Among their duties were the regulating of state ceremonies and religious rites and the care of the calendar, and in religious matters they were the supreme authority. The *pontifex maximus,* or chief pontiff, held his office for life and could not leave Italy. This title is now given to the pope.

Pon'tus, the name formerly given a region occupying the northeastern part of Asia Minor and bordering on the Black Sea. Originally Pontus was a part of Cappadocia. The kingdom was founded about the beginning of the third century, and it rose to considerable power under Mithridates the Great. The name is not used by modern geographers.

Poodle, a small dog, distinguished by its long hair. The usual color is white, but black and blue poodles are known and highly valued. There are several varieties, most of which are kept for pets. One kind is used in some parts of England to hunt for truffles. The smallest poodles are kept for lap dogs and are affectionate little companions, with marked intelligence.

Pool, a game played on a table which differs from the common form of billiard table only in having six pockets, into which the balls may roll. These pockets occupy the four corners of the table and the middle of each side. There are a number of different games of pool, of which the following may be considered the more important.

Fifteen-ball pool is a game played with one cue ball and 15 object balls. At the beginning of the game these object balls are put in a frame and arranged in the form of a triangle in the middle of the foot of the table, with the apex pointing toward the players. The first player shoots from the head of the table at the triangle of balls and endeavors to knock them into the pockets. If he succeeds in putting one down, he shoots again, and so on until he misses a shot, when his opponent takes his turn, shooting from where the cue ball lies. After this manner the game is continued until all the balls are in the pockets. Then each player counts as many points as he has put balls into the pockets. If at any time a player knocks the cue ball into a pocket, one of the balls which he has put down is placed on the table again at the foot. The next player places the cue ball again at the head of the table and shoots as at the beginning of the game. It is customary to *call the shot*, that is, to indicate the pocket into which an object ball is to be driven. In the common form of the game, all the object balls are of uniform red, but the game may be modified by having the object balls of different color, each bearing a number, in which case the count is made according to the numbers on the balls which are put into the pockets. Any number of people from two to a half-dozen may play the game.

Pin pool is played on a regular pool table or on a billiard table. Five small pins are placed in the center of the table on five spots, which are numbered as in the following diagram, in which the number 1 is toward the head of the table:

4
3 5 2
1

Each pin counts as many points as are indicated by the number of the spot on which it stands. Three balls are used, two object balls and a cue ball. At the beginning of the game the two object balls are placed on spots at the ends of the table, and the pins are placed in the center. The cue ball is shot from the head of the table at the farther object ball, with the purpose of knocking down the pins with either of the balls, after hitting the object ball. At the beginning of the game each player is given, usually from a leather bottle, a small ball, on which is marked a number. This number the player counts as the beginning of his score, but makes no announcement of it unless he wins the game, which consists of exactly 31 points. If a player's score becomes greater than 31 he "bursts" and loses all that he has made and must begin over. Whenever the pins are knocked down, they are put back upon the spots where they originally stood. If in any shot the player knocks down the four outer pins, leaving the center one standing, he wins the game. Any number may play.

Other games which are modifications of the two pool games described are numerous. Sometimes the leather bottle, one pin and an object ball are used, and the bottle and pin are set upon the table where they fall, the former counting 10 and the latter 5, and the game being any number previously determined on. A different game may be played on the regular pool table, in which four balls are used, one counting 5, another, 3, and a third, 1, when put into the pockets. In this game the player scores also regular billiard shots. If the cue ball is put into the pocket at any time, the player loses all he has made in that turn and must give way to the next player. Whatever the number fixed for the limit of the game, it must be made exactly. If the person makes too many points, he loses all that were made in that turn.

Poole, William Frederick (1821–1894), an American librarian, born at Salem, Mass., and educated at Yale. While there he was librarian of a literary society, and prepared the well-known *Index of Periodical Literature*, of which a second edition was published in 1853, and a third, with the assistance of the American and British Library Associations, in 1882. A supplement by Poole and W. J. Fletcher, of Amherst, was issued in 1888, and later supplementary volumes were published. From 1856 to 1869 he was librarian of the Boston Athenaeum; afterward he was employed as organizer of libraries and as librarian in various parts of the country, as at Waterbury, Conn., the naval academy at Annapolis, at Cincinnati, and at Chicago (the Public and the Newberry libraries).

Poo′na, a city of Bombay, British India, on the river Mutha, about 75 mi. s. e. of Bombay. The city is well built. It has the Deccan College for classics, mathematics and philosophy; a government college of science, with special training in civil engineering; normal schools, and other educational institutions, together with a public library and a hospital. It was the capital of the Peshwa, head of the Mahratta confederacy. It is a health resort and for a part of the year is the seat of the Bombay government. Its manufactures include gold and silver jewelry, small ornaments in brass and ivory, and silk and cotton fabrics. It is an important military station, and good roads connect it with Bombay and other cities.

Poore, Benjamin Perley (1820–1887), an American journalist, born near Newburyport, Mass. He was sent to a military school to prepare for West Point, but ran away and became a printer's apprentice. At the end of his service his father bought the *Southern Whig* at Athens, Ga., and Poore edited this paper for two years, when he entered the diplomatic service of the United States at Brussels. Later he traveled extensively as the foreign correspondent of the *Boston Atlas*. Returning to America in 1848, he became editor of the *Boston Bee* and *Sunday Sentinel* and also acted as correspondent of other papers at Washington. For many years he was clerk of the Senate committee on printing records and assisted in compiling and editing the *Political Register and Congressional Directory* and a descriptive catalogue of the government publications of the United States. He also wrote *The Conspiracy Trial for the Murder of the President*, biographies of Generals Taylor and Burnside and other works of biography and travel.

Popayan, *po pa yahn′*, a city of Colombia, situated near the Cauca River, at an elevation of about 5700 feet above the sea. Its chief buildings include a cathedral, a college and a theological seminary. The city is on the commercial route which extends through Quito to Trujillo, Peru, and is the center of an important trade. Population in 1902, estimated at 18,000.

Pope, the name given to the bishop of Rome, the head of the Roman Catholic Church. The emperor Phocis decreed that to the Roman pontiff exclusively belonged the distinction of universal bishop. St. Peter is regarded as the first of the pontiffs of the Roman Catholic Church, because of Christ's words, "And I say to thee; That thou art Peter, and upon this rock I will build my Church; and the gates of hell shall not prevail against it." According to tradition, Peter planted a church at Rome and died there a martyr.

Leo I, surnamed the Great (440–461), aimed to establish in the East and West a system of Papal vicariates, through which the Roman jurisdiction could be enforced and the Roman forms of faith permanently maintained. In the West he succeeded, but in the East his success was only partial and temporary. In 451 the Council of Chalcedon accepted the creed formulated by Leo, stating fully and clearly the belief in the union of the divine and human natures of Christ in one person. The fact that in 452, armed with none but spiritual weapons, Leo went out to meet the terrible Attila and actually induced him to leave Italy without attacking Rome, is a convincing proof of the faith of the pope and the power of the Church at this time.

During the German occupation of Italy, the relations of the popes with the barbarian rulers were friendly, and the Church continued to prosper. Under the Byzantine sovereignty, the prestige of the Church seemed in danger of disappearing. But this calamity was averted by the invasion of the Lombards, who drove the Byzantine garrisons from the country. During the following centuries of change, confusion and ruin, the Christian Church alone retained its organization. Even the Lombards were in time converted to Christianity, and the people who, until the overthrow of the emperor, had been accustomed to depend upon Rome for guidance in temporal affairs now continued to look thither for spiritual control, and the bishop of Rome was acknowledged throughout western Europe as the head of the Church. Thus for centuries the papacy gained strength, the Christian fathers, Augustine, Gregory the Great and a host of other active men, shaping its doctrines and policy. In 754 Pepin I, the Frankish king, expelled the Lombards from their recent conquests and guaranteed to the papacy the temporal sovereignty of a stretch of territory including Rome and a considerable surrounding country (See PAPAL STATES). In the year 800, Pope Leo III crowned Pepin's son Charlemagne Holy Roman Emperor, thus restoring the Western Empire. Many causes now combined to extend the power of the Church. During the political strife of the Dark Ages the Church afforded a refuge to the oppressed. In the convents and monasteries alone did learning flourish. Priests were therefore the teachers, secretaries and ambassadors of kings.

Gradually the bishops acquired the right to try all cases relating to marriage, trusts, perjury, simony, or concerning widows, orphans or Crusaders, and even some criminal cases. Thus by the end of the twelfth century the Church had absorbed not only the whole legislative power over the clergy, but in part over the laity also. Consequently, the principle was established that all cases might be appealed from the courts of the bishops and archbishops of the different European countries to the pope. The pope thus came to be regarded as the fountain of justice and the supreme judge of Christendom, while emperors and kings bore the sword simply as his ministers to carry into effect his sentences and decrees.

In the tenth century, when Otto the Great assumed the title of Holy Roman Emperor, there began between the pope and the emperor a contest for supremacy which lasted many centuries. During this time all Christendom was virtually divided into two parties, the members of which were respectively supporters of the imperial or the papal claims. The Crusades greatly strengthened the papal power, as the prominent part which the popes took in them naturally fostered the papal authority, by placing in the hands of the popes the armies and resources of Christendom and accustoming the people to look to them as guides and leaders.

Pope Gregory VII, or Hildebrand, by means of excommunication and interdict, carried on two important reforms, the enforcement of celibacy among the secular clergy and the suppression of simony; thus doing much toward establishing the universal spiritual and temporal sovereignty of the pope. In the thirteenth century the papal power gained a signal triumph over the imperial party by its victory over the House of Hohenstaufen. In the period which follows, the authority of the popes was at its height. Under Pope Innocent III (1198–1216) almost all the kings and princes of Europe swore fealty to the pope as their overlord.

One of the severest blows given both the temporal and the spiritual authority of the popes was the removal in 1309 of the papal chair from Rome to Avignon, France. During the seventy years or so while it remained there, all the popes were French and, their policies being shaped according to French ideas, the papacy ceased to possess that sacred cosmopolitan character which had hitherto characterized it. The Catholic world was not again united under a spiritual head until the election of Martin V in 1417. But the temporal rulers of France, Germany and England, taking advantage of the disturbed condition of the papal see, successively revolted and freed themselves from the authority of the papacy as touching political or governmental affairs. They continued, however, to recognize the pope as the head of the Church and the rightful arbiter in all spiritual matters. In the sixteenth century the popes took such a prominent part in the political movements of Europe that their territory and jurisdiction were greatly extended, but the opposition which had been slowly gathering in the North culminated in the Protestant Reformation, which directly challenged the traditional supremacy of the papacy. The answer of the Church was clearly set forth in the decrees of the Council of Trent (1543–1553), which reaffirmed in unmistakable terms the beliefs of the Church of Rome.

At the close of the eighteenth century and in the nineteenth, changes took place in Europe which closely affected the papal power. In 1797 the pope was obliged to cede several of the states of the Church to Napoleon. A year later the remaining papal States were erected into a Roman republic, but in 1801 the papal power was partly restored over them. In 1808–1809 they were incorporated in the French Empire, but were again restored by the aid of the Austrians in 1815. When Pius IX ascended the papal throne in 1846, his chief aim was to bring about a confederation of the Italian states under the papal supremacy. With this object in view, he placed himself at the head of the movement for reform, reorganized the municipal government of Rome and granted a constitution to the Papal States. In 1848 Pius was forced to flee to Gaeta, while Rome was proclaimed a republic. In 1850 he was restored to his rightful place by the aid of the French. In 1860 a large part of his dominions was annexed by Victor Emmanuel, and in 1870 the remnant of the Papal States voted for union with the kingdom of Italy, depriving the pope of dominion. In accordance with the conviction of Roman Catholics generally, that it is not fitting that the head of the Church be subject to any temporal ruler, the pope has since 1870 remained in the Vatican, where his jurisdiction is still supreme. In spiritual matters, the papal authority has, however, never been stronger than at the opening of the twentieth century, and even in temporal affairs the papal influence continues to make itself felt through the pope's vicegerents in every land.

By the decrees of the Vatican Council of 1870, the pope has supreme power in matters of discipline and faith over all and each of the pastors and of the faithful. It is further taught by the Vatican Council that when the pontiff speaks *ex cathedra*, that is, when he, in virtue of his apostolic office, defines a doctrine of faith and morals to be held by the whole Church, he possesses infallibility, by divine assistance. The pope cannot annul the constitution of the Church as ordained by Christ. He may condemn or prohibit books, alter the rites of the Church and reserve to himself the canonization of saints. A pope has no power to nominate his successor, election being entirely in the hands of the cardinals, who are not bound to choose one of their own body. The papal insignia are the tiara, or triple crown, the straight crosier and the pallium. He is addressed as "Your Holiness."

We subjoin a table of the popes, according to the Roman Notizie, with the dates of the commencement of their pontificates. The names printed in italics are those of antipopes.

St. Peter	A. D. 42
St. Linus	66
St. Anacletus	78
St. Clement I	91
St. Evaristus	100
St. Alexander I	108
St. Sixtus I	119
St. Telesphorus	127
St. Hyginus	139
St. Pius I	142
St. Anicetus	157
St. Soterus	168
St. Eleutherius	177
St. Victor I	193
St. Zephirinus	202
St. Calixtus I	217
St. Urban I	223
St. Pontianus	230
St. Anterus	235
St. Fabian	236
St. Cornelius	250
St. Lucius I—*Novatianus*	252
St. Stephen I	253
St. Sixtus II	257
St. Dionysius	259
St. Felix I	269
St. Eutychianus	275
St. Caius	283
St. Marcellinus	296
(See vacant 3 years and 6 months.)	
St. Marcellus I	308
St. Eusebius	310
St. Melchiades or Miltiades	311
St. Sylvester I	314
St. Marcus	336
St. Julius I	337
Liberius	352
St. Felix II (sometimes reckoned an anti-pope)	355
St. Damasus I	366
St. Siricius	384
St. Anastasius I	398
St. Innocent I	402
St. Zosimus	417
St. Boniface I—*Eulalius*	418
St. Celestine I	422
St. Sixtus III	432
St. Leo I, the Great	440
St. Hilary	461
St. Simplicius	468
St. Felix III	483
St. Gelasius I	492
St. Anastasius II	496
St. Symmachus	498
St. Hormisdas—*Lawrence*	514
St. John I	523
St. Felix IV	526
Boniface II—*Dioscorus*	530
John II	533
St. Agapetus I	535
St. Sylverius	536
Vigilius	537
Pelagius I	555
John III	560
Benedict (I) Bonosus	574
Pelagius II	578
St. Gregory I, the Great	590
Sabinianus	604
Boniface III	607
St. Boniface IV	608
St. Deusdedit	615
Boniface V	619
Honorius I	625
(See vacant 1 year and 7 months.)	
Severinus	640
John IV	640
Theodorus I	642
St. Martin I	649
St. Eugenius I	654
St. Vitalianus	657
Adeotatus	672
Donus or Domnus I	676
St. Agathon	678
St. Leo II	682
St. Benedict II	684
John V	685
Conon — *Theodorus; Paschal*	686
St. Sergius I	687
John VI	701
John VII	705
Sisinnius	708
Constantine	708
St. Gregory II	715
St. Gregory III	731
St. Zachary	741
Stephen II (died before consecration)	752
Stephen III	752
St. Paul I—*Constantine; Theophylactus; Philip*	757
Stephen IV	768
Adrian I	772
St. Leo III	795
Stephen V	816
St. Paschal I	817
Eugenius II	824
Valentinus	827
Gregory IV	827
Sergius II	844
St. Leo IV	847
Benedict III—*Anastasius*	855
St. Nicholas I	858
Adrian II	867
John VIII	872
Marinus I, or Martin II	882
Adrian III	884
Stephen VI	885
Formosus	891
Boniface VI (reigned only 18 days)	896
Stephen VII	896
Romanus	897
Theodorus II — *Sergius III*	898
John IX	898
Benedict IV	900
Leo V	903
Christopher	903
Sergius III	904
Anastasius III	911
Lando	913
John X	914
Leo VI	928
Stephen VIII	929
John XI	931
Leo VII	936
Stephen IX	939
Marinus II, or Martin III	943
Agapetus II	946
John XII—*Leo VIII*	956
Benedict V	964
John XIII	965
Benedict VI	972
Donus or Domnus II	974
Benedict VII	975
John XIV—*Boniface VII*	983
John XV	985
Gregory V — *John XVI*	996
Sylvester II	999
John XVI or XVII	1003
John XVII or XVIII	1003
Sergius IV	1009
Benedict VIII—*Gregory VI*	1012
John XVIII or XIX	1024
Benedict IX (deposed) —*John XX*	1033
Gregory VI—*Sylvester III*	1045
Clement II	1046
Damasus II—*Benedict IX* attempts to resume the throne	1048
St. Leo IX	1049
Victor II	1055
Stephen X	1057
Benedict X	1058
Nicholas II	1058
Alexander II—*Honorius II*	1061
Gregory VII (Hildebrand) — *Clement III*	1073
(See vacant 1 year.)	
Victor III	1086
Urban II	1088
Paschal II	1099
Gelasius II—*Gregory VIII*	1118
Calixtus II	1119
Honorius II — *Celestine II*	1124
Innocent II—*Anacletus II; Victor IV*	1130
Celestinus II	1143
Lucius II	1144
Eugenius III	1145
Anastasius IV	1153
Adrian IV (Nicholas Breakspear, an Englishman)	1154
Alexander III—*Victor V; Paschal III; Calixtus III; Innocent III*	1159
Lucius III	1181
Urban III	1185
Gregory VIII	1187
Clement III	1187
Celestinus III	1191
Innocent III	1198
Honorius III	1216
Gregory IX	1227
Celestinus IV	1241
(See vacant 1 year and 7 months.)	
Innocent IV	1243
Alexander IV	1254
Urban IV	1261
Clement IV	1265
(See vacant 2 years and 9 months.)	
Gregory X	1271
Innocent V	1276
Adrian V	1276
John XIX or XX or XXI	1276
Nicholas III	1277
Martin IV	1281
Honorius IV	1285
Nicholas IV	1288
(See vacant 2 years and 3 months.)	
St. Celestinus V	1294
Boniface VIII	1294
Benedict XI	1303
Clement V (papacy removed to Avignon)	1305
(See vacant 2 years and 3 months.)	
John XXII	1316
Benedict XII—*Nicholas V at Rome*	1334
Clement VI	1342
Innocent VI	1352
Urban V—*Clement VII*	1362
Gregory XI (throne restored to Rome)	1370
Urban VI	1378
Boniface IX—*Benedict XIII at Avignon*	1389
Innocent VII	1404
Gregory XII	1406
Alexander V	1409
John XXIII	1410
Martin V — *Clement VIII*	1417
Eugenius IV — *Felix V*	1431
Nicholas V	1447
Calixtus III	1455
Pius II	1458
Paul II	1464
Sixtus IV	1471
Innocent VIII	1484
Alexander VI	1492
Pius III	1503
Julius II	1503
Leo X	1513
Adrian VI	1522
Clement VII	1523
Paul III	1534
Julius III	1550
Marcellus II	1555
Paul IV	1555
Pius IV	1559
St. Pius V	1566
Gregory XIII	1572
Sixtus V	1585
Urban VII	1590
Gregory XIV	1590
Innocent IX	1591
Clement VIII	1592
Leo XI	1605
Paul V	1605
Gregory XV	1621
Urban VIII	1623
Innocent X	1644
Alexander VII	1655
Clement IX	1667
Clement X	1670
Innocent XI	1676
Alexander VIII	1689
Innocent XII	1691
Clement XI	1700
Innocent XIII	1721
Benedict XIII	1724
Clement XII	1730
Benedict XIV	1740
Clement XIII	1750
Clement XIV	1769
Pius VI	1775
Pius VII	1800
Leo XII	1825
Pius VIII	1829
Gregory XVI	1831
Pius IX	1846
Leo XIII	1878
Pius X	1903

Pope, ALEXANDER (1688–1744), a celebrated English poet. As he was sickly and deformed, his education was desultory; he picked up the rudiments of Greek and Latin from the family priest and was successively sent to two schools, one at Twyford, the other in London. Before he was fifteen he attempted an epic poem, and by the time he was eighteen he had finished the *Pastorals,* which, when they were published in 1709, attracted much notice. In 1711 he published his poetical *Essay on Criticism,* which was followed by *The Rape of the Lock,* a polished and witty narrative poem, founded on an incident of fashionable life. His next publications were *The Temple of Fame*, a modernization and adaptation of Chaucer's *House of Fame*; *Windsor Forest*, a pastoral poem, and *The Epistle of Eloisa to Abelard*. From 1713 to 1726 he was engaged on a poetical translation of Homer's works, the *Iliad* being wholly from his pen the *Odyssey* only half. The *Iliad*, while it does not reproduce the spirit of the original, is a brilliant production. The critic Bentley, on first reading the translation, said: "It is a pretty poem, Mr. Pope, but you must not call it Homer." In 1728 Pope published his *Dunciad*, a mock heroic poem, intended to overwhelm his antagonists with ridicule; and in 1742 he added to it a fourth book, in which he ridiculed Colley Cibber, then poet laureate. The *Dunciad* was followed by *Imitations of Horace* and by *Moral Essays*, one of which was the *Essay on Man*.

In his own day, Pope was considered the greatest of all English poets. Later judgment modified this estimate greatly, and by some it has been denied that Pope was a poet at all, in the true sense of the term. But while he had little genuine feeling and little imagination, he was brilliant and had the art of expressing things neatly, so that he is more quoted than any other English poet except Shakespeare.

Pope, John (1822–1892), an American soldier, born at Louisville, Ky., and educated at West Point. He entered the engineering service, fought in the Mexican War under Taylor, took part in government and private surveys in the West after its close, and at the opening of the Civil War was made brigadier general, in command of the northern district of Missouri. He drove the Confederates from the state, coöperated with Foote in the capture of Island No. 10, participated in the battle at Corinth and was made brigadier general in the regular army, with command of the Army of Virginia. His first engagement was a severe defeat at Bull Run by Generals Lee and Jackson. He was relieved from command at his own request and was given charge of an expedition against the Sioux. Later he was given charge of a military district in the South during reconstruction, and of other departments, and was made major general in the regular army in 1882.

Pop'lar, a well-known genus of hardy trees, belonging to the same family as the willow. The leaves are broad, with long and slender footstalks, flattened vertically, which generally gives them more or less of a tremulous motion. About eighteen species have been observed, natives of Europe, central and northern Asia and North America. Some of the poplars are the most rapid growers of all hardy forest trees. They thrive under a variety of conditions as regards soil and climate, but they do best in damp ground. The timber of the poplar is white, light and soft and is not very valuable. The Lombardy poplar is distinguished by its branches, which grow upward and quite close to the trunk. The common poplar of the United States is often called *cottonwood*, because of the cotton-like fiber which appears with the blossoms.

Popocatepetl, *po po'ka ta pet'l,* (smoking mountain), a volcano in Mexico, in the State of Puebla, 26 mi. w. of the city of Puebla. It is semi-active. Its height is about 17,500 feet and its crater is about 2600 feet in diameter and from 600 to 700 feet deep. It contains large quantities of the purest sulphur, which until comparatively recently has not been commercially valuable. Forests cover the base of the mountain, but its summit is covered with snow. The last great eruption of the volcano was in 1548.

Pop'py, the common name for plants bearing large, brilliant flowers, that last usually but a single day. The white poppy yields the well-

POPPY

known opium of commerce (See OPIUM). Most of the species are natives of Europe. They often occur as weeds in fields and waste places and are frequently cultivated in gardens for ornament. The seeds of the white poppy yield a harmless oil, employed for culinary purposes; and the oil-cake is used for feeding cattle. The roots of the poppy are annual or perennial; the calyx is composed of two leaves, and the corolla has four petals; the stamens are numerous, and the capsule is one-celled, with several longitudinal partitions and a multitude of seeds.

Popular Sovereignty. See SQUATTER SOVEREIGNTY.

Population. The power of propagation inherent in all organic life may be regarded as infinite. There is no one species of vegetable or animal, which, under favorable conditions as to space, climate and food (that is to say, if not crowded and interfered with by others), would not in a small number of years overspread every region of the globe. To this property of organized being the human species forms no exception. Taking mankind in the mass, the individual desire to contribute to the increase of the species may be held to be universal, but the actual growth of population is nowhere left to the unaided force of this motive, and nowhere does any community increase to the extent of its theoretical capacity, even though the growth of population has come to be commonly considered as an indispensable sign of the prosperity of a community. For one thing, population cannot continue to increase beyond the means of subsistence, and every such increase must lead to a destruction of life. The possibility of such increase has been denied by some economists. But if population is limited by the means of subsistence, it will only be checked or arrested by this agency, after it has exceeded the means of subsistence. It becomes of great importance, then, to inquire by what kind of checks population is actually arrested. This inquiry was first systematically treated in an *Essay on the Principle of Population*, published in 1798 by the Rev. T. R. Malthus. Malthus argued that population increases in a geometrical ratio, while the means of subsistence increase only in an arithmetical ratio; that, therefore, the normal tendency of population has always been to press continuously upon the means of subsistence. But, he says, there have been two classes of checks at work limiting the increase of population, preventive and positive; the one, consisting of those causes which prevent births, such as vice, disease and moral restraint; the other, of those which, by abbreviating life, cut off actual excesses of population, such as war, famine and disease.

The population of the world at the beginning of the twentieth century is not far from a billion and a half. The latest estimates give the following density of population:

	AREA IN THOUSANDS of SQ. MI.	POPULATION IN MILLIONS	PERSONS PER SQ. MI.
Asia.........	17,296	868	50.18
Africa........	11,500	178	15.47
Australasia....	3,740	6.4	1.71
America.......	16,000	150	9.37
Europe.......	3,800	394	103.68

Pop'ulist Party or **People's Party,** a political party in the United States, organized in 1891 by a convention of delegates representing chiefly the agricultural and laboring classes. It was the outgrowth of the Granger (See GRANGE) and Farmers' Alliance movements, and its first platform demanded the free coinage of silver, the abolition of national banks, the issue of paper currency in sufficient amounts to relieve the demand for money, the national ownership of all public utilities, a graduated income tax, popular election of United States senators, the initiative and referendum and the prohibition of ownership of American lands by aliens. In 1892 the party nominated James B. Weaver of Iowa for president and James G. Field of Virginia for vice-president, and it polled more than a million votes and received twenty-two electoral votes. In 1896 the party endorsed William Jennings Bryan, the candidate of the Democrats, but nominated an independent candidate for vice-president, Thomas E. Watson of Georgia, though a great majority of the party supporters voted for the Democratic candidate, Arthur Sewall. Those who insisted upon maintaining the party organization and voted for Watson were called "middle of the road" Populists. In 1900 the party again accepted the Democratic candidate, W. J. Bryan, but it again nominated an independent nominee for the vice-presidency, Charles A. Towne of Minnesota. Towne later withdrew, however, and Stevenson was substituted by the national executive committee of the party. In 1904 the party nominated independent candidates; for president, Thomas E. Watson, for vice-president, Thomas H. Tibbles of Nebraska, but it polled scarcely one-tenth of the votes which it had received in 1892 and secured no electoral votes.

Por′cupine, the name of certain animals whose bodies are covered, especially on the back, with quills, or dense, solid, spine-like structures, intermixed with bristles and stiff hairs. The muzzle is generally short and pointed and the ears are short and rounded. The *common,* or *crested, porcupine,* found in southern Europe and in northern Africa, is the best-known species. Its general color is a grizzled, dusky black. When fully grown it measures nearly two feet in length, and some of its spines exceed one foot. The spines in their usual position lie nearly flat, with their points directed backward; but when the animal is excited they are erected and afford strong protection against an enemy. The quills are loosely inserted in the skin and may, on being violently shaken, become detached—a circumstance which has given rise to the false statement that the animal possesses the power of throwing its quills, like arrows or darts, at an enemy. These animals burrow during the day, and at night they search for food, which consists chiefly of vegetable matter. Of the American species, the *Canadian,* or *North American, porcupine,* is the best known. It is about two feet long and is of slow and sluggish habits. The quills of this species are short and are concealed among the fur. The largest porcupines are found in India, and these have pure white bristles.

PORCUPINE

Por′gy or **Porgee,** a fine food fish, common in the Mediterranean Sea and in the Pacific and Atlantic oceans. There are several different species, and different names are given the fish in different localities. The species most common along the Atlantic coast is known as the *scup.*

Pork, the flesh of the hog. In the United States pork is more generally used than any other meat. Large quantities are also shipped to European countries. The variety of products is greater than from any other kind of meat. Pork contains more fat than beef or mutton, is not so easily digested and needs to be thoroughly cooked. The annual output of pork products in the United States is over $100,000,000. See Bacon; Ham; Lard; Sausage.

Poros′ity, the property of possessing pores. All substances are porous. Some, like sponge and bread, have large pores, while others, like iron and gold, have extremely small ones. We know that such substances as iron and other metals are porous, because water and some kinds of gas can be forced through thin layers of them, when sufficient pressure is used.

Porphyry, *por′fi ry,* the name given to a class of rocks which have the crystals of one mineral scattered more or less evenly through the mass of another. Feldspar forms the mass in most varieties. Some porphyries are incorrectly called marble. Porphyries vary greatly in color. Some are dark green, others are dark red, while still others are of various shades of ocher. All varieties are hard; they take and retain a high polish and are valuable building stones.

Porpoise, *por′pus,* a genus of mammals belonging to the dolphin family of the Cetacea. The common porpoise occurs plentifully off the British coast and in the North Sea. Its average length is five feet. The skin, which is perfectly hairless and about an inch thick, makes a flexible leather and is used much in the manufacture of shoestrings and other small articles. The porpoise feeds almost entirely on herrings and other fish and is usually seen in large schools. An allied species is the *round-headed,* or *caaing, whale* of Shetland. This latter is about twenty-four feet in length and is hunted for the sake of the valuable oil, which is found just beneath the skin, and also for its flesh. See Dolphin.

Port′age, Wis., the county-seat of Columbia co., 35 mi. n. of Madison, on the Wisconsin River, at the terminus of the ship canal to the Fox River, and on the Wisconsin Central and the Chicago, Milwaukee & Saint Paul railroads. It is in a productive agricultural region, has a large trade and contains manufactures of flour, brick, hosiery, knit goods, farm implements and other articles. The city has a public library, contains good high school and municipal buildings and owns the waterworks. The ruins of Fort Winnebago are in the vicinity. The place was settled in 1835 and was chartered as a city in 1854. Population in 1905, 5524.

Port Ar′thur, a city situated at the extremity of the Liao-tung peninsula in Manchuria and on the Strait of Pe-chi-li. It is the terminus of one of the branches of the Trans-Siberian railway and is also has an excellent harbor. The town was fortified and made a naval station by the Chinese in 1891. Three years later it was captured by the Japanese, but the Russian government compelled them to release the port when the Chino-Japanese War was settled. In 1898 Port Arthur was leased by the Russians, who proceeded to fortify it strongly. It was the scene of a memorable siege during the Russo-Japanese War, and on June 1, 1905, it surrendered to the Japanese forces. By terms of the treaty which closed the war, Port Arthur remains under the control of Japan.

Port Arthur Ship Canal, an artificial waterway, forming a part of the connection between Sabine Lake, in Texas, and the Gulf of Mexico. This lake is on the boundary between Texas and Louisiana and its outlet passes through a long, narrow channel, known as Sabine Pass. At the outer end of this pass navigation was formerly obstructed by a bar, and this was removed by the construction of jetties, which extended into the Gulf for about a mile. This work was done by the United States government and has resulted in deepening the channel from sixteen to twenty-five feet, in making Port Arthur a seaport for the largest ocean-going vessels, and in affording an excellent outlet for many of the agricultural products and other exports of that region.

Port-au-Prince, *por to praNs'*, or **Port Republicain,** capital of the Republic of Haiti, on the western side of the island, at the southeast extremity of the Bay of Gonaives. It is built on a low and unhealthful plateau, consists chiefly of wooden houses, and has a palace, a senate house, a cathedral, a customhouse, a mint and a hospital. The chief exports are redwood, coffee and cocoanuts. Population, about 60,000.

Port Chester, N. Y., a village in Westchester co., 26 mi. n. e. of New York City, on Long Island Sound and on the New York, New Haven & Hartford railroad. It is a residence suburb and has a reputation as a summer resort. It contains foundries, carriage works, screw and bolt factories, a woolen mill and other manufacturing establishments. The village has a hospital, a public library, a high school and a park. The place was settled about 1742, was called Saw Pit until 1837 and was incorporated as a village in 1868. Population in 1905, 11,198.

Port Elizabeth, a city of Cape Colony, situated at the western extremity of Algoa Bay, about 425 mi. e. of Cape Town. Its harbor is protected by jetties, and it has an extensive commerce. It is the seat of Gray Institute, has a botanical garden, several parks and a public library and is considered the second town of importance in the colony. Population in 1904, 32,921.

Porter, David (1780–1843), an American naval officer, born at Boston. He early went to sea and suffered impressment by British vessels, but escaped and entered the United States navy in 1798. He served on the *Constellation* in the famous battle with the *Insurgent,* became a lieutenant, and was captured by the Barbary pirates in 1803, while serving on the *Philadelphia.* As commander of the *Essex* in the War of 1812, he captured many British vessels, but while on a cruise in the Pacific in March, 1813, he was captured, after a desperate conflict against great odds. At the close of the war he was made commodore, commanded expeditions against the West Indian pirates and was suspended from the service for compelling the Spanish authorities at Porto Rico to apologize for an insult to his flag, thus exceeding his express authority. He resigned and entered the Mexican navy, but left it in 1829 and thereafter served the United States as consul general to the Barbary powers and as *charge d'affaires* at Constantinople. He was father of Admiral David Dixon Porter, and in 1809 he adopted David Glasgow Farragut as a son.

Porter, David Dixon (1813–1891), an American naval officer, born in Chester, Pa. He entered the United States navy as a midshipman in 1829, served during the entire Mexican War and was in every action on the coast. At the beginning of the Civil War he was placed in command of the steam frigate *Powhatan,* and his services soon won for him the rank of commander. In command of a mortar fleet he rendered assistance in the reduction of forts Jackson and Saint Philip and in the capture of Arkansas Post. His able coöperation with Grant in the siege of Vicksburg gained him a commission as rear admiral. In 1865, while in command of the North Atlantic blockading squadron, he, with General Terry, captured Fort Fisher. In 1866 he was promoted to vice-admiral, and in 1870 he was appointed admiral.

Porter, Fitz John (1822–1901), an American soldier, born at Portsmouth, N. H. He was educated at West Point and served through the Mexican War, winning the brevet ranks of captain and major. After serving for a time as instructor at West Point, he was with Albert Sidney Johnston on the Utah Expedition in 1857, and at the opening of the Civil War he was made brigadier general of volunteers. Later he held the command of a division in the Army of the Potomac and gained distinction in the battles of Mechanicsville, Gaines's Mill and Malvern Hill. His command took part in the second Battle of Bull Run, where he remained inactive the first day and was especially active the second day. This action caused him to be court-martialed and dismissed from the service. He was restored with the rank of colonel by an act of Congress in 1886 and was retired at his own request.

Porter, HORACE (1837–), an American soldier and diplomat, born at Huntingdon, Pa. He was educated at the Lawrence Scientific School at Harvard and at West Point and had just graduated from the military school when the war broke out. He entered the army and served in several important campaigns, winning especial distinction at Chickamauga and Chattanooga. Later he became a member of Grant's staff and remained with him until the close of the war. In 1867 General Porter was made assistant secretary of war in Johnson's cabinet, and on Grant's accession to the presidency he became his private secretary. In 1897 he was appointed ambassador to France by President McKinley.

Porter, JANE (1776–1850), an English novelist. Her most important novels were *Thaddeus of Warsaw* and *Scottish Chiefs*, the latter the best historical romance up to the time of Scott.

Porter, NOAH, (1811–1892), an American philosopher, writer and educator, born at Farmington, Conn. He was graduated from Yale College in 1831 and for the next fifteen years served as pastor of Congregational churches in New Milford, Conn., and Springfield, Mass. When the Clark professorship of metaphysics was established at Yale, Doctor Porter was the first to fill the chair, and he held the position during the remainder of his life. In 1871 he was elected president of Yale University and retained the position for fifteen years, when he resigned. During his presidency Doctor Porter taught the classes in his department, preached in the college church and engaged in literary work. He attained his widest reputation as editor in chief of two standard editions of Webster's Dictionary. The best known of his published works are *The Human Intellect*, which for a quarter of a century was a standard textbook on psychology, and *The Elements of Moral Science.*

Port Hudson, SIEGE OF, a siege in the Civil War, conducted by Federal forces under General Banks against the village of Port Hudson, Louisiana, which had been strongly fortified by the Confederates and was occupied by a force under General Gardner. The siege began March 26, 1863, after Admiral Farragut had secured control of the river on both sides of the town. Several unsuccessful assaults were made, but finally, on July 7, when the news of the surrender of Vicksburg reached Port Hudson, Gardner surrendered the garrison, numbering about 6000.

Port Hu'ron, MICH., the county-seat of Saint Clair co., 60 mi. n. e. of Detroit, on Lake Huron, at the head of the Saint Clair River and at the mouth of the Black River, and on the Pere Marquette and two lines of the Grand Trunk railroad. The city is built on both sides of the Black River, and there is a railroad tunnel under the Saint Clair River to Sarnia, Canada. Port Huron has connection by boat with the other ports on the Great Lakes and conducts a large trade. There are several dry docks and shipbuilding yards, engine and thresher works, railroad shops, foundries and various other factories. The climate, scenery, mineral springs and fishing facilities have made the place a popular summer resort. It has a Carnegie library, a law library, two business colleges, more than thirty churches, four banks, a public hospital and home and several public parks. Other prominent structures are the Federal building, the city hall, the courthouse, Maccabee Temple and a number of good business blocks. The place was settled by a French colony in 1790, and was known by various names until its organization as the village of Port Huron in 1849; it was chartered as a city in 1857. Population in 1904, 20,028.

Port Jervis, *jur'vis*, N. Y., a village in Orange co., 88 mi. n. w. of New York City, on the Erie and the New York, Ontario & Western railroads and on the Delaware River at the mouth of the Neversink, near the junction of the New York, New Jersey and Pennsylvania state lines. It is in a picturesque region containing many waterfalls, and has become a popular summer resort. It has a Y. M. C. A. building, a Carnegie library, an orphanage and a hospital. There are large railroad shops, glove factories, plating works and manufactories of neckties, overalls, saws and other articles. The place was settled in the last of the eighteenth century, and it was laid out as a village in 1826. Population in 1905, 9695.

Port'land, MAINE, the county-seat of Cumberland co., 63 mi. s. by w. of Augusta and 108 mi. n. by e. of Boston, Mass., on Casco Bay and on the Maine Central, the Boston & Maine and the Grand Trunk railroads. It is the largest city and the commercial metropolis of the state and covers an area of more than 17 square miles. The streets are regularly laid out, and there are about 115 acres of parks, containing a soldiers' monument and a fine bronze statue of Longfellow. The city has a public library and that of the Maine Historical Society, more than fifty churches, a medical college, two high schools, public kindergarten and manual training schools, parochial schools and two business colleges. The charitable institutions include the Maine General Hospital, the United States Marine Hospital and homes for orphans and for aged men and aged women. The birthplaces of Longfellow and Neal Dow and the Longfellow mansion, where the poet lived, are of interest. Other prominent buildings are the city hall, the armory, the customhouse, the postoffice, the Cathedral of the Immaculate Conception, Saint Luke's Cathedral, Union Depot, Mechanics' Hall, several large hotels and a number of business blocks.

Portland has a deep harbor and has been an important trading center since colonial times. It has an extensive coastwise trade, and at least six foreign steamship lines make connection here. The port has large warehouses and grain elevators and is a very important shipping port for Canada. The industrial establishments of Portland include locomotive and car works, rolling mills, hat factories, boot and shoe shops, tanneries, foundries, machine shops and other factories.

The place was settled in 1632 and was known by the indian name of Machigonne. It was then successively called Stogomer, Casco Neck and Falmouth. In 1676 the village was destroyed by indians, and after other settlers had come the place was again ravaged in 1690. In 1715 a settlement was made which proved permanent. It was incorporated as the town of Portland in 1786 and was chartered as a city in 1832. Population in 1900, 50,145; estimated in 1905, 60,000.

Portland, Ore., the county-seat of Multnomah co. and the chief city of the state, is situated on the Willamette River, 12 mi. from its junction with the Columbia, about 100 mi. from the Pacific coast and 772 mi. n. of San Francisco. It is on the Southern Pacific, the Northern Pacific, the Union Pacific, the Great Northern and other railroads. The town is beautifully situated on both banks of the Willamette, which rise gradually from the river. It is regularly laid out, has broad, well-paved streets, lined with shade trees, contains many substantial public buildings and business blocks and has beautiful homes, which are surrounded by lawns filled with shade trees and flowers. Among the important buildings are the Portland Hotel, the city hall, the postoffice, the chamber of commerce, the union railway station, the industrial exposition building, the office of the *Oregonian* and the Marquam Block. The educational institutions include Portland University, Saint Michael's College, Portland Academy and the law and medical departments of the University of Oregon.

The city is an important industrial and commercial center. The Willamette admits the largest ocean steamers as far as Portland, and the city has one of the best fresh-water harbors in the world. The Willamette is also navigable for river boats for more than 100 miles above the city. The chief manufacturing industries consist in the making of lumber, machinery, woolen goods, flour, fur garments, furniture, paints, oils and soap. There are numerous plants of minor importance. The exports of the city include large quantities of wheat, fruit, lumber, flour and salmon. The extent and rapid development of these industries have made Portland one of the wealthiest cities of its size in the United States. From Portland Heights, near by, an extensive view of the surrounding country, including Mount Hood and Mount Rainier, may be obtained. Population in 1900, 90,426; in 1905, estimated at 145,000.

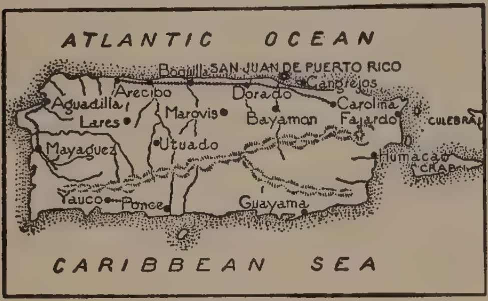
Portland, Isle of, a peninsula of England, extending into the English Channel. It is about 4½ miles long and 2 miles wide. It is the seat of one of the greatest English prisons and also has a large harbor formed by breakwaters, one of which is 2 miles long. Population in 1901, 15,199.

Port Louis, *loo'is*, the capital of the island of Mauritius, is situated at the head of a bay on the northwest side of the island. Its harbor is strongly fortified, and the town contains a number of pretentious buildings, including two cathedrals, a gymnasium, a theater, a mint, schools and an astronomical observatory. It is also the terminus of two lines of railway. Population in 1900, 53,978.

Port'o Rico, *re'ko*, one of the West India islands, situated between 17° 50′ and 18° 30′ north latitude and between 65° 30′ and 67° 15′

west longitude, 1000 mi. e. by s. of Key West and 1500 mi. s. e. of New York. The island is nearly rectangular in outline, is about 100 miles long and averages a little over 30 miles in width. Its area, including a number of small islands around the coast, is 3670 square miles, or about three-fourths that of Connecticut.

Surface and Drainage. A range of low mountains or hills extends across the island in an east and west direction. These have an altitude of from 2000 to 3000 feet, and the highest peak, in the northeastern part of the island, reaches 3609 feet. From this range of hills the land slopes north and south. Along the coast are stretches of nearly level low land, but the interior of the island is elevated and hilly.



PORTO RICO

The rivers are all short and rapid. While a few of them have estuaries which serve as harbors, none of them is navigable for any distance, though all are more or less valuable for water power. Those of importance flowing to the north coast are the Bayamon, the Loiza, the La Plata, the Manati and the Tanama. The Blanco flows to the western coast, and the Guayanes is the most important stream flowing to the south. There are numerous lagoons along the coast, and there are a few small lakes in the interior.

Climate. Porto Rico is within the region of the northeast trade winds, which modify its temperature so that it does not suffer from the intense heat of some regions within the same latitude. The climate of the high land in the interior is also more salubrious than that along the coasts. The thermometer seldom rises above 100° in the hottest months or falls below 50° in the coldest. The mean annual temperature at San Juan is about 80°. The rainfall varies, averaging 60 inches at San Juan and 100 inches or more on the northeast coast. The north side of the island, because of the prevailing winds, receives more rain than the south side, on which there are some localities where irrigation is occasionally necessary to the successful growing of crops.

Mineral Resources. Some lignite has been found, and for years gold has been found in small quantities along the beds of streams. There are also deposits of platinum, mercury, nickel, copper and iron, but none of these appears to be of sufficient value to warrant working. An excellent quality of marble is found in the island, and clay suitable for brick and tile is widely distributed. There are also valuable deposits of gypsum, which is used for plaster and fertilizer; on the southern coast phosphates exist in large quantities, and on Mona Island, off the west end of Porto Rico, as well as in several places along the neighboring coast, are valuable deposits of guano. These have not as yet been extensively worked.

Agriculture. Agriculture is the chief occupation and engages the attention of considerably more than half the population. The most primitive methods of cultivation and the very rudest of implements, however, are in use, but American implements and methods are being gradually introduced. On the lowlands sugar cane is grown more extensively than any other crop, while coffee flourishes in the altitudes varying from 600 to 2000 feet. The third crop in importance is tobacco. This is followed by tropical fruits, which are rapidly gaining in quantity and the number of varieties, the chief fruits being oranges, bananas and pineapples. An upland variety of rice is grown and used for food.

Manufactures. The manufactures are limited and are of comparatively little importance. Chief among these is the making of sugar. Of lesser magnitude are the manufacture of straw hats and other straw goods, the tanning of leather and the refining of petroleum. San Juan is the chief manufacturing center.

Transportation. The island has few good roads; but a portion of the revenue is each year devoted to the construction of highways, and in time good highways will connect all the larger towns. There are about 130 miles of railway, which is a portion of a belt line designed to encircle the island. There are electric cars in San Juan and Ponce. San Juan on the north, the port of Ponce and Guanica on the south, Fajardo on the east and Mayaguez on the west, are the chief seaports. Regular lines of steamers ply between New York and the island, and also between Porto Rico and some of the ports of

England, Spain, South America, and other West India ports. The commerce is largely with the United States.

INHABITANTS. The population consists of Spaniards and other whites, who constitute about three-fifths of the inhabitants; negroes, and people of mixed Spanish and negro blood. There are also a few Chinese. Spanish is the prevailing language. The people live in rural communities, and there are no large cities on the island.

GOVERNMENT AND RELIGION. After its occupation by the United States a form of territorial government was organized in Porto Rico. The executive consists of a governor appointed by the president of the United States, with the advice and consent of the Senate, and an executive council of eleven members, appointed in the same manner. Five of these must be natives of Porto Rico. The legislature consists of this council, which is an upper chamber, and a house of delegates of 35 members, elected by popular vote for two years. For the purpose of election and local administration, the island is divided into seven districts. Other officers appointed by the president are a treasurer, an attorney-general and a commissioner of education. The old system of courts has been partially superseded by the American system. The island is given a representative at Washington, but he does not have a seat in Congress; neither are the citizens of Porto Rico citizens of the United States. Nearly all the inhabitants are Roman Catholics.

EDUCATION. A system of elementary schools on the American plan is in operation. These are under the immediate supervision of a commissioner of education. Schoolhouses are being erected, and native teachers are being trained as rapidly as funds for the work can be secured. A territorial university has been established by the government, and there is also a normal school for the training of teachers and a high school at San Juan. The Spanish language is generally taught, and most of the text-books are in this language, though English is being rapidly introduced. Considering the time since the occupation by the United States, the work of education has made remarkable progress.

HISTORY. Porto Rico was visited by Columbus on his second voyage in 1493 and was named San Juan Bautista. In 1508 Ponce de Leon landed on the island, and two years later he began its conquest. The Spaniards soon subdued and enslaved the natives, and within the next few decades, under their rigorous rule, most of the natives died. Negroes were then imported for slaves. With the exception of a few decades during European wars, the island remained in peaceful possession of Spain, but its development was slow, owing to the colonial policy of that country. Several minor attempts at revolt were made, and one of these in 1867 caused some anxiety, but was speedily suppressed. Two years later Porto Rico was made a province of Spain and allowed representation in the national parliament. After eleven years, however, this favor was withdrawn. During the Spanish-American War the island was occupied by the United States forces under Admiral Sampson and General Miles on July 20, 1898. At the Treaty of Paris, Porto Rico was surrendered to the United States. Population in 1899, 953,243.

Port Republicain, *por ra pü ble kaN′*. See PORT-AU-PRINCE.

Port Said, *sa eed′*, a city of Egypt, situated at the Mediterranean entrance of the Suez Canal. It has a large, deep harbor, which is well protected by piers and by a breakwater. The importance of the town rests in the fact that it is at the entrance of the canal, and because of this it has considerable shipping business. At the entrance of the harbor is a statue of Ferdinand De Lesseps, the engineer of the canal (See SUEZ CANAL). Population, about 42,000.

Portsmouth, *ports′muth*, a seaport and the chief naval station of England, situated at the southwest extremity of Portsea Island, 65 mi. s. w. of London and 18 mi. s. e. of Southampton. The harbor is four miles long and nearly as wide and is large enough to accommodate the entire British navy. The town and harbor are protected by extensive fortifications, considered the best in Great Britain. The buildings and industries are comparatively unimportant. The city was the birthplace of Charles Dickens. Population in 1901, 188,133.

Portsmouth, N. H., one of the county-seats of Rockingham co., 58 mi. n. by e. of Boston, on the Boston & Maine railroad and on the Piscataqua River, 3 mi. from the Atlantic Ocean. It is the only seaport in the state and has a large, deep harbor and a considerable coasting trade. The industrial establishments include a large shoe factory, several breweries, marble works and manufactures of shoe buttons, button-sewing machines, locks and other goods. Portsmouth has a beautiful location, is of considerable historical interest and still contains several colonial mansions. The Isles of Shoals and many other places in the vicinity are popular summer resorts. The Portsmouth navy yard is on an island formerly known as Fernald's Island, now within the limits of the township of Kittery, Maine. The city has three parks, a public library and the Athenaeum, containing a museum and a large library. Other buildings of note are the old residences of governors Wentworth and Langdon, the Saint John's Church and the Federal building. The place was settled in 1623 and was known for many years as Strawberry Bank. It was incorporated as Portsmouth in 1653 and was chartered as a city in 1849. After the organization of New Hampshire in 1679, it was the capital of the state until 1807. The United States District Court of New Hampshire now holds its sessions alternately at Concord and Portsmouth. In the summer of 1905 the treaty which closed the Russo-Japanese War was negotiated here. Population in 1900, 10,637.

Portsmouth, Ohio, the county-seat of Scioto co., 100 mi. s. of Columbus, on the Ohio River, at the mouth of the Scioto and at the terminus of the Ohio Canal, and on the Baltimore & Ohio Southwestern, the Norfolk & Western and the Chesapeake & Ohio railroads. There are also several steamship lines on the river. The city is in a fertile agricultural region, with considerable mineral wealth, and it has become an important industrial center. It contains a public library, a hospital and several charitable homes. There are five attractive parks, and the Scioto valley contains interesting remains of the Mound Builders. The various manufactures include shoes, brick, stoves, cars, furniture, veneering, foundry and machine shop products, paper boxes and other articles. Population in 1900, 17,870.

Portsmouth, Va., the county-seat of Norfolk co., on the Elizabeth River, opposite Norfolk, with which it is connected by a ferry. It is on the Seaboard Air Line and the Southern railroads, while the other roads entering Norfolk also maintain connections here. The city is regularly laid out and is a popular residence place for Norfolk business men. It contains the United States navy yard, a naval hospital and a city park. There are also extensive cotton mills, railroad shops and other factories. There is a large trade in lumber, cotton, naval stores, fruits and vegetables. The place was settled in 1752 and was chartered as a city in 1858. The Trinity Episcopal Church was first built in 1762 and is of historic interest. On the present site of the navy yard, the British government operated shipyards before the Revolution. Population in 1900, 17,427.

Port Town'send, the county-seat of Jefferson co., Wash., situated on the west coast of Puget Sound, near its junction with the strait of Juan de Fuca, 35 mi. n. w. of Seattle, and on the Port Townsend Southern railway. It occupies an important strategic position, and the harbor is strongly fortified. The industries include foundries, machine shops, boiler works, canneries, fisheries and a ship yard. Population in 1900, 3443, since which date it has materially increased.

Por'tugal, a kingdom situated in the extreme southwestern part of Europe. It lies between 37° and 42° north latitude and between 6° 15′ and 9° 30′ west longitude, and is bounded on the n. and e. by Spain and on the s. and w. by the Atlantic Ocean. Its greatest length from north to south is 350 miles, and its average width, about 100 miles. The area of Portugal proper is 34,254 sq. mi., or a little more than that of Maine. But with the Azores and Madeira islands, which are usually considered a part of the kingdom, the area is 35,490 sq. mi., making it a little larger than Indiana.

Surface and Drainage. Portugal is only partially separated from Spain by natural boundaries. Its shape is nearly that of a parallelogram. The coast line, of great length in proportion to the extent of the whole surface, runs in a general south-southwest direction till it reaches Cape Saint Vincent, where it suddenly turns east. The coast is occasionally bold and rises to a great height; but the far greater part is low and marshy, and is not infrequently lined by sands and reefs, which make navigation dangerous. The interior is generally mountainous, a number of ranges stretching across the country, forming a succession of independent river basins, while their ramifications form the watersheds of numerous tributary streams and enclose many beautiful valleys. The loftiest range is the Serra da Estrella, a continuation of the central chain stretching across Spain, which attains the height of 7524 feet.

Climate. The climate is greatly modified by the proximity of the sea and the height of the mountains. In general the winter is short and mild, and in some places it never completely interrupts the course of vegetation. Early in February vegetation is in full vigor; during the month of July the heat is often extreme, and the country assumes, particularly in its lower levels, a very parched appearance. The drought generally continues into September; then the rains begin, and a second spring unfolds. Winter begins at the end of November. In the mountainous districts the loftier summits obtain a covering of snow, which they retain for months; but south of the Douro, and at a moderate elevation, snow does not lie long. The mean annual temperature of Lisbon is about 56°.

Mineral Resources. The mountains contain large deposits of minerals, including lead, manganese, tin, zinc and antimony. Coal is mined at Cape Mondego and is also found in the vicinity of Leria. Salt is produced in large quantities, most of it being obtained from the sea. It is of excellent quality and is exported to various countries of Europe. But with this exception and the working of copper and coal mines to a limited extent, the mining industry is wholly undeveloped. What few mines there are are operated by foreigners, and the works are on a limited scale.

Agriculture. The mild and equable climate adapts the country to agriculture, and almost any crop common to central and southern Europe can be grown successfully. Fruits are grown throughout the country, but the warmer districts in the south are noted for the production of oranges, lemons and olives. The mulberry is also cultivated on a large scale, but the cultivation of grapes and the manufacture of wines is the most important branch of the fruit industry. Notwithstanding the natural advantages, agriculture is in a deplorable condition, and in ordinary years the country fails to raise enough cereals to meet the demands of the population. Wheat, barley, oats, flax and hemp are cultivated on the higher land, while rice is grown on the lowlands. The raising of live stock is an important branch of agriculture, and a considerable number of horses, cattle, goats and swine are exported. The culture of the silkworm is also important, and considerable raw silk is produced.

Manufactures. The manufactures are comparatively unimportant. The leading centers are Oporto and Lisbon. The most important industries include shipbuilding and the manufacture of cotton and woolen goods, linen, silk, leather, spirits, porcelain, tobacco, hats, ironware, shoes and soap.

Transportation. The large rivers which enter the country from Spain are navigable to the Spanish border and greatly aid in the transportation of commodities. There are also numerous good harbors along the coast. The country has about 1500 miles of railroads, over one-third of which belong to the state. These lines connect all the important towns and also connect the leading cities with the commercial centers of Spain. The foreign trade is nearly all carried in English ships. The exports consist of wine, cork, copper ore, olive oil, fruits and live stock, while the imports include coal, raw cotton, fish and manufactured articles such as cannot be readily produced in the country. The foreign trade is chiefly with Great Britain, Germany, Brazil and the United States.

Literature. The oldest monuments of Portuguese literature do not go back further than the twelfth and thirteenth centuries, and the native literature could then boast of nothing more than popular songs. The sixteenth century is the classic era of Portuguese literature. The chief names are Sâ de Miranda, Gil Vicente and Camões. The principal epic and the greatest poem in the Portuguese literature, almost the only one which has acquired a European reputation, is the *Os Lusiadas* of Camões (See Camões, Luis de). The drama also began to be cultivated in the sixteenth century. Sâ de Miranda studied and imitated Plautus; Ferreira composed the first regular tragedy, *Ines de Castro*, and Camões wrote several theatrical pieces. By the opening of the seventeenth century Portugal's literary greatness had been succeeded by a period of little real power, though of great activity. During this period the native drama became almost extinct, being overshadowed by the Spanish. In the eighteenth century the influence of the French writers of the age of Louis XIV so completely dominated Portuguese literature that it became almost entirely imitative. Toward the close of this century two writers appeared who formed schools, Francisco Manoel do Nascimento (1734–1819), an elegant lyrist, and Barbosa du Boccage, who introduced an affected and hyperbolical style of writing. Among more recent poets there have been a number who possess some claim to originality, and through their efforts Portuguese literature has again begun to assume an aspect of native vigor. In art, Portugal has never distinguished herself.

Government and Religion. The government is a constitutional monarchy, the throne being hereditary; it may descend to a woman when there is no male heir. The king is irresponsible, all of his acts being signed by his ministers, who thereby assume the responsibility for the government. The legislature, called the Cortes, consists of two branches, the House of Peers and the Chamber of Deputies. The House of Peers is composed of the princes of the royal blood, twenty-five years of age or over, the bishops and archbishops and about ninety peers appointed by the king for life. But the hereditary peerages are being gradually abolished. The members of the Chamber of Deputies are chosen at a general election, the right to vote being confined to male citizens twenty-one years of age who can read and write or who pay a certain amount of tax. For the purpose of local government the country is divided into twenty-one districts, which are again divided into communes, and these are subdivided into parishes. Each district has its local assembly, elected by the voters, and an executive commission, chosen from among the members of the assembly.

The Roman Catholic Church is the leading church, and nearly all of the inhabitants profess that faith. All other forms of worship are tolerated.

Education. In education the country is very backward. While there is a compulsory primary education law, it is not enforced, and only a small proportion of the children of the laboring classes attend school. Consequently, the percentage of illiteracy is very large, more than one-half of the people being unable to read and write. Secondary schools are maintained in the principal town of each district, and there are many private schools of similar grade, also institutions for giving industrial, commercial and technical training. The University of Coimbra, founded in 1290, is the leading educational institution.

Inhabitants and Language. The people are rather short of stature, have dark complexion, with dark or black hair and dark eyes. The Portuguese sprung largely from the intermarriage of former native inhabitants with African and Brazilian negroes that were imported into the country centuries ago. There are many remains of ancient dwellings throughout the country, showing that Portugal was occupied by a civilized people as far back as the days of the Roman Empire. Without doubt many of these works were constructed by the ancient Romans. The language closely resembles the Spanish.

Colonies. The foreign possessions of Portugal, situated in Africa and Asia, are as follows:

Colonial Possessions	Area in English Sq. Mi.	Estimated Population
In Africa:		
Cape Verde Islands	1,480	147,424
Guinea	13,940	820,000
Prince's and Saint Thomas's Islands	360	42,103
Angola	484,800	4,119,000
East Africa	293,400	3,120,000
In Asia:		
In India: Goa	1,469	475,513
Damão, Diu	169	56,285
Indian Archipelago	7,330	300,000
China: Macao, etc.	4	63,991
Total	802,952	9,144,316

Cities. The chief cities are Lisbon, the capital; Oporto, Setubal, Faro, Figueira and Vienna.

History. The Phoenicians, Carthaginians and Greeks early traded in this part of the peninsula, the original inhabitants of which are spoken of as Lusitanians, the country being called Lusitania. It was afterward conquered by the Romans, who introduced into it their own civilization. The country was later inundated by Suevi, Goths and Vandals, and in the eighth century it was conquered by the Saracens. When the Spaniards finally wrested the territory between the Minho and the Douro from Moorish hands (997), they placed counts, or governors, over this region. Henry of Burgundy, grandson of Hugh Capet, came into Spain about 1090, to seek his fortune in the wars against the Moors, and Alfonso VI of Leon gave him the hand of his daughter and appointed him count of Portugal. The count, who owed feudal services to the Castilian kings, was permitted to hold in his own right whatever conquests he should make from the Moors beyond the Tagus. Henry's son, Alfonso I (1128–1185), defeated the king of Castile and made himself independent, gained the brilliant victory of Ourique over the Moors and was saluted on the field as king of Portugal. The Cortes confirmed him in the royal title, and in 1181 gave to the kingdom a code of laws and a constitution. The succeeding reigns from Sancho I (1185–1211) to Denis (1279–1325) are noteworthy chiefly for the conflict with the pope, who several times put the kingdom under interdict. Denis's wise encouragement of commerce, agriculture, manufactures and navigation laid the foundation of the future greatness of Portugal.

Denis was succeeded by Alfonso IV, who in turn was succeeded by his son Pedro. Dying in 1367, Pedro I was succeeded by Ferdinand, on whose death in 1383 the male line of the Burgundian princes became extinct. John I, the natural son of Pedro, was saluted king by the estates, and he proved an excellent sovereign. In 1415 he took Ceuta, on the African coast, and this was the first of a series of enterprises which resulted in those great expeditions of discovery on which the renown of Portugal rests. The reigns of his son Edward (1433–1438) and his grandson Alfonso V (1438–1481) were less brilliant than that of John I; but the latter was almost surpassed by that of John II (1481–1495), perhaps the ablest of Portugal's rulers. In his reign began a violent struggle with the nobility, whose power had become very great under his indulgent predecessors. The expeditions of discovery were continued; Bartholomeu Diaz doubled the Cape of Good Hope, Vasco da Gama reached India, and Brazil was taken possession of for Portugal by Cabral.

While these great events were still in progress, John II was succeeded by his cousin Emmanuel (1495–1521), under whom the power of Portugal reached its height. In the reign of John III, son of Emmanuel (1521–1557), Indian discoveries and commerce were still further extended; but the rapid accumulation of wealth, through the importation of the precious metals and the monopoly of the commerce between Europe and India, proved disadvantageous to home industry. The wisdom which had hitherto so largely guided the counsels of the kings of Portugal now seemed to forsake them. The Inquisition was introduced, and the Jews, who were among the wealthiest and most industrious citizens of the country, were driven out. Sebastian, the grandson of John III, lost his life in a battle against the Moors and left his throne to the disputes of rival candidates, of whom the most powerful, Philip II of Spain, obtained possession of the kingdom by the victory of Alcantara. The Spanish yoke was grievous to the Portuguese, and many efforts were made to throw it off; but the power of Philip was too great to be shaken. In 1640, by a successful revolt of the nobles, Portugal recovered her independence, and John IV, duke of Braganza, reigned till 1656, when he was succeeded by Alfonso VI. Pedro II, who deposed Alfonso VI, concluded a treaty with Spain (1668), by which the independence of the country was acknowledged.

During the long reign of John V (1706–1750) some vigor was exerted in regard to foreign relations, while under his son and successor, Joseph I (1750–1777), the Marquis of Pombal, a vigorous reformer such as Portugal required, administered the government. On the accession of Maria, eldest daughter of Joseph, in 1777, the power was in the hands of an ignorant nobility and a not less ignorant clergy. In 1792, on account of the sickness of the queen, John, the crown prince, was declared regent. His connection with England involved him in war with Napoleon; Portugal was occupied by a French force under Junot and the royal family fled to Brazil.

In 1808 a British force was landed under Wellington, and after some hard fighting the decisive Battle of Vimeira took place, which was followed by the Convention of Cintra and the evacuation of the country by the French (See PENINSULAR WAR). The French soon returned, however; but the operations of Wellington, and in particular the strength of his position within the lines of Torres Vedras, forced them to retire. The Portuguese now took an active part in the war for Spanish independence. On the death of Maria in 1816, John VI ascended the throne of Portugal and Brazil, in which latter country he still continued to reside. The absence of the court was viewed with disfavor by the nation, and the general feeling required some fundamental changes in the government. A revolution in favor of constitutional government was effected without bloodshed in 1820, and the king was invited to return home, which he now did. In 1822 Brazil threw off the yoke of Portugal, and proclaimed Dom Pedro, son of John VI, emperor. On the death of John, the Brazilian emperor Pedro became king of Portugal, and he granted a new constitution, modeled on the French, in 1826. In this year he abdicated the Portuguese throne in favor of his daughter Maria da Gloria, imposing on her the condition of marrying her uncle Dom Miguel, who was intrusted with the government as regent; but the absolutist party in Portugal set up the claim of Dom Miguel to an unlimited sovereignty, and a revolution in his favor placed him on the throne. In 1831 Dom Pedro resigned the Brazilian crown, and returning to Europe he succeeded in overthrowing Dom Miguel and restoring the crown to Maria, but died himself in 1834. In 1836 a successful revolution took place in favor of the restoration of the constitution of 1820, and in 1842 another in favor of that of 1826. Maria died in 1853. Her husband, Ferdinand of Coburg, became regent for his son, Pedro V, who began to reign in 1855. Pedro died in 1861, being succeeded by his brother Louis I. In 1889 Louis died and was succeeded by his son Carlos I, who with the crown prince was assassinated Feb. 1, 1908, the second son, Manuel II, becoming king. Population in 1900, 5,423,132.

Portuguese, *por'tu geez,* **East Africa** or **Mozambique,** a Portuguese colony occupying the coast region extending from German East Africa, on the north, to the Transvaal Colony, on the south. The western boundary is formed by British Central Africa, Rhodesia and Transvaal Colony. The region is crossed by the Zambezi River, which divides it into two nearly equal sections. The area is 301,000 square miles. Most of the surface is low and swampy along the coast and rises to a higher level in the interior, which is covered with forests. The Namuli Mountains, with an altitude of 7500 feet, and the Serra da Gorongaza are the highest elevations. Most of the region has an unhealthful climate for Europeans. The native inhabitants are Bantus, and they are generally engaged in agriculture, raising large crops of corn, tobacco, palm nuts, rubber, indigo, coffee and sugar. Some gold and coal are obtained. Laurenço Marquez, the capital, is connected with Pretoria by railway, and in all there are about 300 miles of railway in the colony. The other important towns are Mozambique, Quilimane, Sofala and Beira. Population, estimated at 3,120,000.

Portuguese Guinea, *gin'e,* a small Portuguese colony on the western coast of Africa, off Senegambia. It includes a small coast territory and the Bissagos Islands. The area is 14,300 square miles. The capital is Bulama. Population, estimated at 200,000.

Portuguese West Africa. See ANGOLA.

Port Wine, a very strong, full-flavored wine, produced in the upper valley of the Douro, Portugal; it takes its name from Oporto, the place of shipment. It is slightly astringent and has a color varying from pink to red. It requires three or four years to mature, and with age it becomes tawny; it receives a certain proportion of spirit, to hasten the process of preparation. The largest quantity exported goes to England. The name *port* is also applied to a wine of similar color and flavor manufactured in California. See WINE.

Poseidon, *po si'don.* See NEPTUNE.

Posen, *po'zen,* a fortified town of Prussia, capital of the Province of Posen, on the Warthe River, 190 mi. n. of Breslau. It is surrounded by two lines of forts, is built with considerable regularity and has, in general, fine wide streets and numerous squares, or open spaces. The most noteworthy public buildings are the Gothic cathedral, built in the eighteenth century; the parish church; the Church of Saint Mary; the Raczynski palace, which contains a large library; the townhall, and the royal palace. The manufactures of the city consist chiefly of cigars, furniture, machinery, distilled liquors and flour. Posen is one of the oldest cities of Poland and was the capital of some of the early Polish kings. Population in 1900, 117,014.

Positivism, *poz'i tiv iz'm,* or **Positive Philosophy.** See COMTE, AUGUSTE.

Postal Savings Banks. See SAVINGS BANKS.

Postmaster-General. See POSTOFFICE.

Postoffice, a department of the government of a country, charged with the conveyance of letters, newspapers and parcels. From the earliest times governments have carried on systems of postal communication, but the "post" as we know it to-day is an institution of very modern growth. The beginnings of a postal service in the United States date from 1639, when a house in Boston was employed for the receipt and delivery of letters for or from beyond the seas. In 1672 the government of New York colony established "a post to goe monthly from New York to Boston"; a general postoffice was established in Virginia in 1692, and in Philadelphia in 1693. A deputy postmaster-general for America was appointed in 1692; at about the same time, a monopoly was established, which included, also, the transport of travelers, and a tariff was fixed. The system, however, proved a failure until 1753, when Benjamin Franklin became postmaster-general; when he was removed from office in 1774 the net revenue exceeded $15,000.

In 1789, when the postoffice department was transferred to the new Federal government, the number of offices in the thirteen states was only about seventy-five. The remarkable progress in the ensuing century is shown in the table below. Important events in the history of the American postal service have been the negotiation of a postal treaty with England (1846); the introduction of postage stamps (1847); of stamped envelopes (1852); of the system of registering letters (1855); the establishment of the free delivery system and of the traveling postoffice system (1863); the introduction of the money order system (1864); the introduction of postal cards (1873); stamped newspaper wrappers and envelopes bearing requests for the return of the enclosed letter to the writer, in case of non-delivery; the formation of the Universal Postal Union (1873); the issue of "postal money orders" (1883); the establishment of a special delivery system (1885), under which letters bearing an extra ten-cent stamp are delivered by special messengers immediately on arrival, and the beginning of the rural free delivery system (1896), by which mail is delivered to rural homes by carrier regularly and without extra charge. The number of rural free delivery routes exceeds 16,000, and more are being opened each year.

The postmaster-general is a member of the cabinet. Under him about 100,000 persons are employed, of whom some 76,000 are postmasters. Most of these, except letter-carriers and clerks, are liable to be removed on the accession to Federal office of a new political party. The following table shows the increase, by decades:

YEARS	OFFICES	MILES	REVENUE	EXPENDITURE
1790...	75	1,875	$37,935	$32,140
1800...	903	20,817	280,804	213,994
1810...	2,300	36,406	552,366	495,969
1820...	4,500	72,492	1,111,927	1,160,926
1830...	8,450	115,176	1,850,583	1,932,708
1840...	13,468	155,739	4,543,522	4,718,236
1850...	18,417	178,672	5,552,971	5,212,953
1860...	28,498	240,954	8,518,067	19,170,610
1870...	28,492	231,232	19,772,221	23,998,837
1880...	42,989	343,888	33,315,479	36,542,804
1890...	62,401	....	60,858,783	66,645,083
1900...	76,688	500,982	102,354,579	107,740,268
1905...	68,131	486,805	152,826,585	167,399,169

The number of postoffices in the United States is one-half larger than that in any other country. It provides a postoffice to every 1,003 persons.

All mail matter is divided into four classes. The first includes letters, postal cards and anything closed against inspection; postage, 2 cents each ounce or additional fraction of an ounce; postal cards, 1 cent; registered letters, 8 cents, in addition to postage. Second-class matter includes all newspapers or periodicals issued as frequently as four times a year; postage, 1 cent per pound or fraction thereof. When the newspapers are sent by persons other than the publishers, the charge is 1 cent for each four ounces. Mail matter of the third class includes books, circulars or proof sheets; postage, 1 cent for each 2 ounces; limit of weight, 4 pounds to each package. The fourth class embraces merchandise and all matter not included in the other three classes; postage, 1 cent per ounce; limit of weight, 4 pounds. Prepayment of postage by stamps for all classes of matter is required.

Larceny in relation to the postoffice is punished with great severity. Every person employed under the postoffice who wrongfully opens or detains a letter or is accessory thereto, is liable to be punished by fine or imprisonment, or by both. If he embezzle, secrete or destroy a letter, he is guilty of felony and is liable to imprisonment.

Pos'tulate. See AXIOM.

Pot'ash, an alkaline substance obtained from the lye of vegetable ashes. It derives its name from the *ashes* and the *pots* (called *potash kettles*) in which the lye was boiled down. An old name was *vegetable alkali.* Potash in this crude state is an impure carbonate of potassium, which, when purified, is known to commerce as *pearl ash.* It is used in the making of glass and in the making of soap, and large quantities of it are now produced from certain "potash minerals," instead of from wood ashes.

Potas'sium, a name given to one of the elements, the metallic basis of potash, discovered by Davy in 1807, constituting one of the first fruits of his electro-chemical researches. Next to lithium it is the lightest metallic substance known. At ordinary temperatures it may be cut with a knife and worked with the fingers. At 32° it is hard and brittle, with a crystalline texture; at 50° it becomes malleable, and in luster it resembles polished silver; at 150° it is perfectly liquid. Potassium has a very powerful affinity for oxygen, which it takes from many other compounds. A freshly-exposed surface of potassium instantly becomes covered with a film of oxide. The metal must therefore be preserved under a liquid free from oxygen, petroleum or naphtha being generally employed. When thrown upon water it decomposes that liquid with evolution of hydrogen, which burns with a pale violet flame, owing to the presence in it of potash vapor. *Chloride of potassium* is known in commerce as "muriate of potash," and it closely resembles common salt. It is obtained from potassic minerals, from the ashes of marine plants and from sea water or brine springs. It enters into the manufacture of saltpetre, alum and artificial manures. *Potassium bromide* appears in the form of white, cubic crystals that have a strong, salty taste. Photographers use it extensively, and it is frequently prescribed in medicine for its quieting influence. *Potassium bicromate* is an important chemical that is used in the preparation of colors and in photo-engraving processes. *Potassium cyanide*, a white crystalline substance, is deadly poison, but it is used to some extent in the arts. Besides these salts, there are a number of other potassium compounds which are of considerable importance. See SALTPETRE; WATER GLASS.

Pota'to, a food plant, belonging to the same family as the nightshade, thorn apple and tobacco. The potato was discovered by the Spaniards after the conquest of Peru, early in the sixteenth century, and by them it was taken to Europe, where it soon spread over the Netherlands, Burgundy and Italy. The plant is highly prized for the tubers, which are fleshy, underground stems, containing a large proportion of starch. As it was found in the wild state, the potato was small and of little value, but the numerous varieties now in general cultivation have been obtained by improving the original species. The value of this plant for food can scarcely be overestimated. At the time of its discovery many countries of Europe were overcrowded and suffering frequent famines, from the failure of their grain crops. Since the potato would thrive in soils where grain could not profitably be raised, it added an important source of food to these countries.

The top or stem is nearly square; it branches frequently, and it grows to the length of from two to four feet, according to the richness of the soil. The blossoms are about three-fourths of an inch in diameter and are white, bluish or pink. The fruit proper is a spherical berry, about the size of a cherry. When ripe it is reddish-brown or purplish and contains a large number of small seeds, but the plant is propagated by planting the tubers, from the eyes of which new plants spring. Varieties are produced from the seeds, but the seed seldom reproduces a variety like that from which it sprang, and those from one berry usually produce several varieties of potato. The first year these are so small that they are useless for any purpose except planting, to reproduce the variety. After several plantings the varieties are tested, and those considered valuable are retained, while the others are destroyed.

Besides its extensive use as an article of food, the potato is used as feed for stock and for the manufacture of starch. Tubers of the best quality are obtained in cool temperate climates, where soil and moisture are favorable to their growth. In the United States, New York, Maine, Vermont, Minnesota and Wisconsin are especially noted for their production of potatoes.

Potato Bug or **Colorado Beetle,** a small beetle of yellow color, with ten black stripes lengthwise of its wings. It is a native of the Rocky Mountains, where it lived, until the country was settled, upon the small wild potato plant. When the cultivation of potatoes was begun in the West, the beetles thrived and multiplied in astonishing numbers, and by 1875 they had spread all over the United States and Canada. The beetles lay their orange-colored eggs on the lower sides of the leaves of the new plants. In about a week these hatch into reddish slugs, which feed hungrily upon the leaves and grow rapidly, fading in color and developing two rows of black spots along the sides. When they have reached maturity they crawl into the ground and soon are changed into full-grown beetles. Spraying with preparations of Paris green will protect the plants, though if the beetles are numerous the plants must be constantly tended.

Poto'mac, a river of the United States, which forms the boundary between Maryland and Virginia, passes Washington, D. C., and after a course of about 450 miles falls into Chesapeake Bay. It is about 8 miles in width at its mouth. The termination of the tide water is at Washington, about 125 miles from the sea, and the river is navigable for large ships to that point. Above Washington there are several falls which obstruct navigation.

Potosi, *po to se'*, a city of Bolivia, situated 50 mi. s. w. of Sucre, at an elevation of about 13,000 feet above the sea. The town has a large public square, containing a government house, a mint, a town house, the treasury and a college; there is also a monument erected in honor of Bolivar. The cathedral dates from 1810. Formerly Potosi was the center of an important silver-mining industry. Population, 20,910.

Pots'dam, a city of Prussia, capital of the Province of Brandenburg and the second royal residence of the kingdom. It is beautifully situated in the midst of wooded hills, 17 mi. s. w. of Berlin, on the Havel. The principal buildings are the royal palace, Garrison Church, a French Protestant church, the town house, the Church of Saint Nicholas and the Barberini Palace. The palace of Sans Souci, in the vicinity of the city, was erected by Frederick the Great. In the neighborhood are the New Palace and Marble Palace. It manufactures optical instruments, sugar and beer. Population in 1900, 59,814.

Pottawatomi, *pot ta wahť o my,* (fire makers), an Algonquian tribe, first met by the whites near Green Bay, Wis. They subsequently moved south and settled on former Miami territory, where Chicago now stands. After the Illinois were driven out, the Pottawatomi occupied the greater portion of what is now the State of Illinois and the southern part of Michigan and northern Indiana.

Potter, Henry Codman (1835–1908), Protestant Episcopal bishop of New York, born in Schenectady. He entered the ministry in 1858. In 1868 he became rector of Grace Church, New York. He was consecrated bishop in 1887. Among his works are *The Citizen in Relation to the Industrial Situation, The Drink Problem in Modern Life* and *The East of Today and Tomorrow.*

Pot′tery, vessels or utensils made out of clay and hardened by firing. The art of making such ware is known as ceramic art.

Pottery is made of various grades of clay, to which sometimes a small proportion of fine sand, powdered feldspar or flint is added, the kind and proportion of these ingredients determining the sort of ware. Clays that contain any appreciable quantity of iron turn red when burned, as in the making of brick, and much of the coarsest grade of earthenware is made of this kind of clay. Other varieties turn to a cream color, and others become a reddish-brown. The finest quality of clay used for pottery is known as *kaolin* and is pure white. Some varieties of clay contain enough sand to make the glaze or enamel, but for most wares this has to be added. The glaze is made by different substances for different wares. That of stoneware, such as common jugs and crocks, is made by throwing common salt into the furnace, where it is decomposed and fuses with the clay. Other varieties of stoneware are glazed by a mixture of white lead, flint and glass ground together, while porcelain is glazed by a still different composition.

MANUFACTURE. The first step in making pottery is to grind the clay to a very fine powder, which is mixed with water into a dough-like mass. In the manufacture of ordinary stoneware, a quantity of this dough sufficient for the vessel is attached to a horizontal wheel called the *potter's wheel,* which is worked by foot power. The workman forms the clay into a cone with a blunt apex; then, by inserting his thumbs into the apex of the cone and revolving the wheel, he roughly shapes the vessel with his hand. After this the walls are pared and smoothed inside and out, by tools of wood or leather. During the working, the clay, tools and hands of the workmen are kept moist. When shaped, the vessel is placed in the drying room, where it is allowed to harden, after which it is ready for burning.

Vessels that are not round are usually cast in molds, made of plaster of Paris, each half of the vessel being made separately and the parts joined together when taken from the molds.

Pottery is burned, baked or fired in kilns, which vary in size and shape according to the sort of ware for which they are designed. The higher grades of ware are placed in cylindrical earthen boxes, called *saggers.* The saggers are stacked in the kiln by packing in tiers, one above the other. The ware is usually raised to a white heat, which is maintained for thirty-six hours or more, after which the kiln is allowed to cool slowly. When cold, the ware is taken from the saggers, and in this state it is called *biscuit.* The rough places on the surface are now smoothed, and other finishing touches are given, after which the ware is glazed. This is done by dipping it in a mixture called the *slip.* This is a solution of the glazing substance in water and is but little thicker than milk. The ware is dipped in, and on being removed it is so handled that no drops are left standing on the surface. The porous walls absorb the water and leave a thin coating on the surface, which, on a second firing, passes into the clay and forms the glaze. By the addition of necessary pigments, coloring can also be produced with the glaze. When this is poured on and allowed to run down until stopped by the heat, beautifully shaded effects are often produced. Different colors on the same article are produced by using different glazes. Decorations are usually put on with a brush, either before or after glazing. If decorated after glazing, the ware must be fired a third time. Decorating requires great care and skill, since the colors, when put on, are entirely different from those which will appear after firing. For instance, gold is put on in the form of a chloride which has a brown color.

VARIETIES. There are many varieties of pottery. Among the most common are the following:

Earthenware, which includes all of the coarser grades of ware, from the ordinary stoneware, of which jugs and crocks are made, to the heavier grades of ware used for culinary and table purposes. Earthenware is undoubtedly the earliest form of pottery, and rude articles are found among all uncivilized peoples.

Stoneware is a high grade of earthenware, and the term is often applied to numerous varieties of ware in most common use. It is hard, well enameled and often beautifully decorated.

Chinaware, or *porcelain*, is the finest grade of pottery. It is made by mixing the best quality of kaolin with a Chinese clay containing a little silica. When fused at a high temperature, these ingredients produce a beautiful translucent ware. Porcelain originated with the Chinese, hence the name china, or chinaware. It is known to have been manufactured as early as 950 B. C., and the Chinese people still show the greatest skill in its manufacture. From China and Japan come the most delicate and beautiful specimens of this ware. The manufacture of china was introduced into Europe early in the sixteenth century, and numerous establishments now exist both on the Continent and in England. The oldest and best known of these is near Dresden, Saxony, and from this city the ware has taken its name. *Dresden china* has attained wide popularity and is prized for its excellent quality and beautiful finish.

Pottery making is one of the oldest of the arts and has been practiced by primitive peoples as well as by civilized nations. Works found in Egypt and Babylonia and in the buried cities of Asia Minor and Greece attest the artistic skill which these peoples attained in their manufacture of pottery ware. See FAIENCE; DELFT; MAJOLICA; TERRA COTTA; WEDGEWOOD WARE.

Potts'town, PA., a borough in Montgomery co., 35 mi. n. w. of Philadelphia, on the Schuylkill River and on the Pennsylvania and the Philadelphia & Reading railroads. It is in an agricultural region and contains rolling mills, blast furnaces, steel mills, bridge works, creameries, and manufactories of nails, agricultural implements, cigars and other articles. The borough has a public high school, a school library, a business college and the Hill School, a private institution for boys. The place was laid out in 1752 and was called Pottsgrove until its incorporation as a borough in 1815. Population in 1900, 13,696.

Potts'ville, PA., the county-seat of Schuylkill co., 35 mi. n. w. of Reading, on the Schuylkill River and on the Philadelphia & Reading, the Pennsylvania, the Lehigh Valley and other railroads. It is in a picturesque region and is visited by many tourists. The borough is surrounded by anthracite coal fields and is principally engaged in mining. It was here that anthracite coal was first used successfully for smelting iron ore. There are railroad shops, a large steel plant, and manufactories of plush, velvet, machinery, textiles and other goods. The borough has a hospital, a county courthouse, a jail, the Commercial Union School and the Pottsville Athenaeum, which contains a library. The place was settled about 1800, was laid out as a town by John Pitt in 1816, was incorporated as a borough in 1828 and was made a city in 1851. Population in 1900, 15,710.

Poughkeep'sie, N. Y., the county-seat of Dutchess co., 74 mi. n. of New York City, on the east bank of the Hudson River and on the New York Central, the New York, New Haven & Hartford and other railroads. A ferry connects with the West Shore railroad, and electric railways extend to several neighboring places. The city is built on an elevation, about 200 feet above the river. It is the seat of Vassar College, several secondary schools and a business college; it also has the Adriance Library, a state hospital for the insane, Saint Barnabas Hospital and several other charitable institutions. College Hill Park contains 100 acres. A cantilever bridge, 7100 feet long, which here spans the Hudson, is of interest. The important industries of the city include machine works, foundries, machine shops, a shoe factory, packing houses, lumber mills and the manufacturing of patent medicines, cigars and cigarettes and other articles. The place was settled by the Dutch in 1698, on the site of an indian village called *Apokeepsing*, meaning *safe harbor*. During the Revolution, after 1778, it was the capital of the state; and the convention which ratified the Federal Constitution met here. It was made a village in 1799 and was chartered as a city in 1854. Population in 1905, 25,379.

Poultry, *pole'try*, a general name for all birds bred for the table or kept for their eggs. The birds most commonly included under this designation are the common fowl, the pea fowl, the guinea fowl, the turkey, the goose and the duck. There is this great difference between the varieties of the domestic fowl: some are disposed by constitution to continue laying throughout the whole season, without sitting; while others, after having laid from twelve to fifteen eggs, sit obstinately and cease to lay. Among the breeds most in favor are those known as Dorking, Game, Hamburg, Cochin, Brahma, Polish, Spanish and Plymouth Rock. Poultry should have a spacious house, with a yard and shed attached. The house should be moderately warm, well lighted and perfectly dry. Poultry raising in the United States has become an important industry, and the entire income exceeds the income from the wheat crop. See DUCK; FOWL; GOOSE; TURKEY.

Pound, a weight of two different denominations, *avoirdupois* and *troy*. The pound *troy* contains 5760 grains, and is divided into 12 ounces; the pound *avoirdupois* contains 7000 grains, and is divided into 16 ounces. The *pound*, or *pound sterling*, the highest monetary denomination used in British money accounts, and equal to 20 shillings, is so called from originally being equal to a quantity of silver weighing one pound. It is strictly a money of account, the coin representing it being the sovereign. It is equivalent to $4.8665; to 25.175 French francs, Italian lira or Spanish pesetas; to 20.412 German marks; to 9.43 Russian rubles and to 18.0278 Danish, Swedish or Norwegian crowns.

Pound′al, the unit employed in measuring force in the English system of weights and measures. It is such a force as, applied to one pound of mass for one second of time, will produce a velocity of one foot per second. See DYNAMICS.

Poussin, *poo saN′*, NICOLAS (1594–1665), a distinguished French historical and landscape painter, born at Andelys, in Normandy. He was very poor in his youth and was unable to go to Rome to study until he was thirty. After this he found liberal patrons in Cardinal Barberini and in the Cavaliere Cassiano del Pozzo, for whom he painted the celebrated *Seven Sacraments*, now at Belvoir Castle. He was also invited to paint the great gallery of the Louvre, and his successes gained him the position of first painter to Louis XIII, with a pension of 3000 livres. From 1640 to 1642 he lived in Paris, but the rivalry of French painters and the want of appreciation of his works by the Parisians induced him to return to Rome, where he lived until his death.

Powder. See GUNPOWDER.

Pow′derly, TERENCE VINCENT (1849–), an American lawyer and administrator, born in Pennsylvania. He began life as a switchman and early in life was identified with various labor organizations. He was elected mayor of Scranton, Pa., in 1878 and was reëlected in 1880 and 1882. In 1879 he was elected general master workman of the Knights of Labor, and held the position until 1893. He was admitted to the bar in the following year, having already achieved a reputation as an orator. Powderly was appointed commissioner-general of immigration in 1897 by President McKinley.

Pow′ell, JOHN WESLEY (1834–1902), an American geologist, born in Mount Morris, N. Y., and educated in Illinois College, Jacksonville, and at Oberlin College, Ohio. In the Civil War he rose to be lieutenant colonel, and at the close of the war he became professor of geology in the Illinois Wesleyan University at Bloomington and later in the Illinois Normal University. In 1867 and years following, under direction of the Smithsonian Institution and the department of the interior, he conducted the geographical and geological survey of the Rocky Mountain region and was the first to explore the canyons of the Colorado. His *Contributions to North American Ethnology*, the results of his work, gained him recognition in the scientific world. In 1881 he was appointed director of the United States Geological Survey. His publications include many scientific papers and addresses and numerous government volumes. He was president of the Anthropological Society of Washington and of the American Association for the Advancement of Science.

Power, in mathematics, the product obtained by using a number as a factor two or more times. The product of a number multiplied by itself is the second power, or square of that number; the product obtained by taking a number three times as a factor is the third power, or the cube of the number; four times, the fourth power, and so on. For example, $4\times4=16$; 16 is the square of 4; $4\times4\times4=64=4^3$; 64 is the cube of 4. The figure denoting the power to which a given number is to be raised is placed at the right and above the given number and is known as the *exponent*. The process of finding a power of a number is called *involution*.

Power of Attorney. See AGENT.

Powers, HIRAM (1805–1873), an American sculptor, the son of a farmer, born at Woodstock, Vt. As a boy he was first employed in a clock factory in Ohio, whither his family had moved, and later he obtained employment in a museum in Cincinnati, remodeling and repairing wax figures. At this period he formed the acquaintance of a German sculptor, and having been taught modeling by him, he determined to become a sculptor. In 1835 he went to Washington and had sufficient success there to enable him to proceed to Italy. He now settled in Florence, where he resided until his death. His first work in Italy was *Eve Tempted,* followed by the *Greek Slave,* which is his best-known work and is considered the first important American work of ideal conception. Among his other works are *Fisher Boy, Proserpine* and busts of Franklin, Jefferson, Washington, Webster, Calhoun, Everett and Sheridan, as well as other eminent Americans.

Powers, The Great, a term of modern diplomacy, used to designate the most powerful nations of the world, now including Great Britain, France, Austria, Germany, Italy, the United States and Russia.

Powhatan′ (1550–1618), an indian chieftain, whose real name was Wahunsonacook, Powhatan being the name of the tribe of which he was ruler. His seat was in Virginia, and he had frequent intercourse with the Jamestown colonists. He at one time held Captain John Smith as prisoner and, it is said, was about to take his life, when Smith was spared through the plea of Pocahontas, the chief's daughter.

Pozzuoli, *pot soo o′le,* a city of Italy, situated on a branch of the Bay of Naples, 7 mi. s. w. of Naples. In ancient times it was one of the most important commercial centers of Italy and was also the residence of many wealthy Romans. Remains of its ancient architecture attest its former grandeur. Among these are an amphitheater, baths and the Temple of Serapis. Population in 1901, 17,146.

Praetor, *pre′tor,* an important magistrate in the ancient Roman State. Up to 367 B. C. the title was borne by the consuls, but, when at that date the consulship was thrown open to the plebeians, the judicial functions of the consul were separated from his other duties and given to a new patrician magistrate, who was called the praetor. In 337 B. C., after a struggle, the plebeians were admitted to this office also. In 246 B. C. another magistracy, that of *praetor peregrinus* (foreign praetor), was instituted for the purpose of settling disputes between foreigners and between foreigners and citizens; and in distinction the other magistrate was termed *praetor urbanus.* After election the two praetors determined their offices by lot. The *praetor urbanus* was first in position and was the chief magistrate for the administration of justice. About 227 B. C. the number of praetors was increased to four and afterward to six and then eight; under the Empire the number varied from twelve to eighteen. After completing his year of office the praetor was often sent as *propraetor* to govern a province.

Praetor′ian Guard, the personal guard of the Roman emperors. Augustus was the first to make of the bodyguard of the commander in chief of the Roman army a regular, permanent force. Under him it consisted of nine cohorts, three of which were kept in Rome and the remainder in the neighborhood of the city. Under the later emperors the praetorians were increased in numbers and given greater importance. In time they gained the chief power in the State and were able to appoint, depose or murder emperors at their will. It was only by bribery of the praetorian guard that a man could secure the imperial dignity or could maintain it after he had secured it. Constantine abolished the institution in 312.

Pragmat′ic Sanction, the name given, originally in the Byzantine Empire, to any important decree regarding affairs of state. The most important pragmatic sanction in the history of Europe was that issued by Charles VI, Holy Roman emperor, settling the succession to the throne on his daughter, Maria Theresa. See Charles VI; Maria Theresa.

Prague, *prayg,* the second city of Austria-Hungary and capital of the Department of Bohemia, is situated on the Moldau River, 160 mi. n. w. of Vienna and 75 mi. s. e. of Dresden, with both of which it is connected by railway. The city is built upon both sides of the river, which is crossed by nine bridges. The site is upon low hills, which rise gradually from the river. The city comprises seven districts. On the east are the districts of Altstadt, Josephstadt, Neustadt and Wischehrad, the newest part of the city; while on the west are the districts of Kleinseite, Hradschin and Holeschowitz-Bubna, which is the industrial part of the city. The Altstadt and Neustadt districts are the most important commercially.

The most interesting part of the city is in the Altstadt. Here, clustered about Grosser Ring, or the principal square, are the Teynkirche, or the old Hussite Church; the Kinsky Palace; the townhall; the Kreuzherrenkirche, constructed after the plan of Saint Peter's at Rome; the Palace of Clan Gallas, the former palace of the Bohemian kings, and the Rudolphinum, a structure containing the conservatory of music, a museum of industrial arts and a picture gallery. Near by are the old university buildings, some of which date from the Middle Ages. In the Cathedral of Saint Viet, in the district of Hradschin, is the marble tomb of the Bohemian kings. The modern buildings include the Bohemian National

Theater, the German Theater and the Bohemian National Museum. The city also contains a number of monuments and statues. The leading educational institution is the University of Prague, which dates from the Middle Ages (See PRAGUE, UNIVERSITY OF). The other educational institutions include the Royal German and Royal Bohemian Polytechnic institutes, a school of art and a conservatory of music. The city also is the home of several distinguished learned societies.

Prague is the second largest industrial city of Austria-Hungary. Most of the manufactories are located in the suburbs. The leading industries include the manufacture of engines, machinery, leather, railway cars, chemicals, spirituous liquors, carriages, furniture, gloves, cotton goods and underwear. There are a number of breweries and flouring mills, and the printing and publishing business is of considerable importance. Population in 1900, 204,498, about seven-eighths of whom are Bohemian.

Prague, UNIVERSITY OF, a name given to two universities situated in the city of Prague, one German and the other Bohemian. The original University of Prague is the oldest German university. It was founded in the middle of the fourteenth century, but was based on a school that originated about one hundred years before. During the Middle Ages it suffered many changes and reverses, because of the religious conflicts by which it was disturbed. In 1419 the Catholics were expelled from the institution, and as a result the university lost much of its property and a large number of students. In the latter part of the fifteenth century a number of colleges were founded, and the university again began to prosper. In the middle of the seventeenth century it became a Jesuit college. The Czech movement of the nineteenth century resulted, at first, in an increase of attendance, but finally in the organization of the Czech University of Prague. In 1882 and 1883 the faculties of law, medicine and arts were established, to which some years later the faculty of theology was added. This gave the Bohemian university a prestige which has enabled it to far outgrow the German university. In 1901 the Czech University had an attendance of over 3000, while that of the German University was less than 1200.

Prai′rie, the name given to the vast natural meadows or plains of the Mississippi basin, especially that portion lying between the river and the Rocky Mountains and extending northward into central Canada. Throughout this immense territory the differences of level are sufficient to produce a steady flow of the rivers, but not so great as to obstruct their navigation, thus securing a unique system of easy intercommunication by water between all sections of the country. There is a sameness in the features of the surface, the vegetable productions, the soil and the geological features. Some of the prairies that have a peculiarly undulating surface are known as *rolling prairies.* Vast herds of buffaloes used to roam over the prairies, but these have now disappeared. Immense tracts are now cultivated and produce large crops of wheat and maize. The prairies now constitute the most valuable agricultural region in the world.

Prairie Chicken, a common name in the United States of the pinnated grouse. See GROUSE.

Prairie Dog, a small animal, allied to the marmot, as well as to the squirrel, found on the prairies west of the Mississippi and east of the Rocky Mountains. These animals live in large colonies in burrows, and as they have a sharp bark, like that of a small dog, they are almost universally called prairie dogs. They are about one foot in length, exclusive of the rather short tail, and are sturdy and stout in form. Their burrows are close together and have a mound of earth near the entrance, on which the little animals are wont to sit and look around them. These communities are termed "villages." The prairie dog is not to be confounded with the prairie squirrel, to which it is allied.

PRAIRIE DOG

Prairie du Chien, *pra′re du sheen′,* the county-seat of Crawford co., Wis., situated on the Mississippi River 60 mi. s. of La Crosse and on the Chicago, Burlington & Quincy and the Chicago, Milwaukee & Saint Paul railroads. The important buildings are the College of the Sacred Heart and Saint Mary's Institute for girls. The industries include the manufacture of barrels, veneer, packing cases, pearl buttons, woolens and pickles. The town is of interest because of its historic associations. Near here was built a French fort in 1689. This, however, was soon abandoned, and another was built in

1755. Permanent settlement dates from 1783. At the close of the Revolutionary War the town and fort were ceded by the English to the United States. They were recaptured in 1812 and held for the space of four years, when they were again returned to the United States. Population in 1905, 3179.

Prairie Squirrel, the common striped gopher. See Ground Squirrel; Gopher.

Prairie Wolf. See Coyote.

Pratt Institute, a co-educational institution for manual and industrial training, established in Brooklyn, N. Y., in 1887, by Charles Pratt. The institute comprises a high school, providing for general education, and normal, art, library, technical and trade departments. There are provisions for both day and evening classes. The department of domestic arts is especially famous for its excellent courses in sewing and cooking. The faculty numbers about 125, and the enrollment is 3500. The library contains over 77,000 volumes.

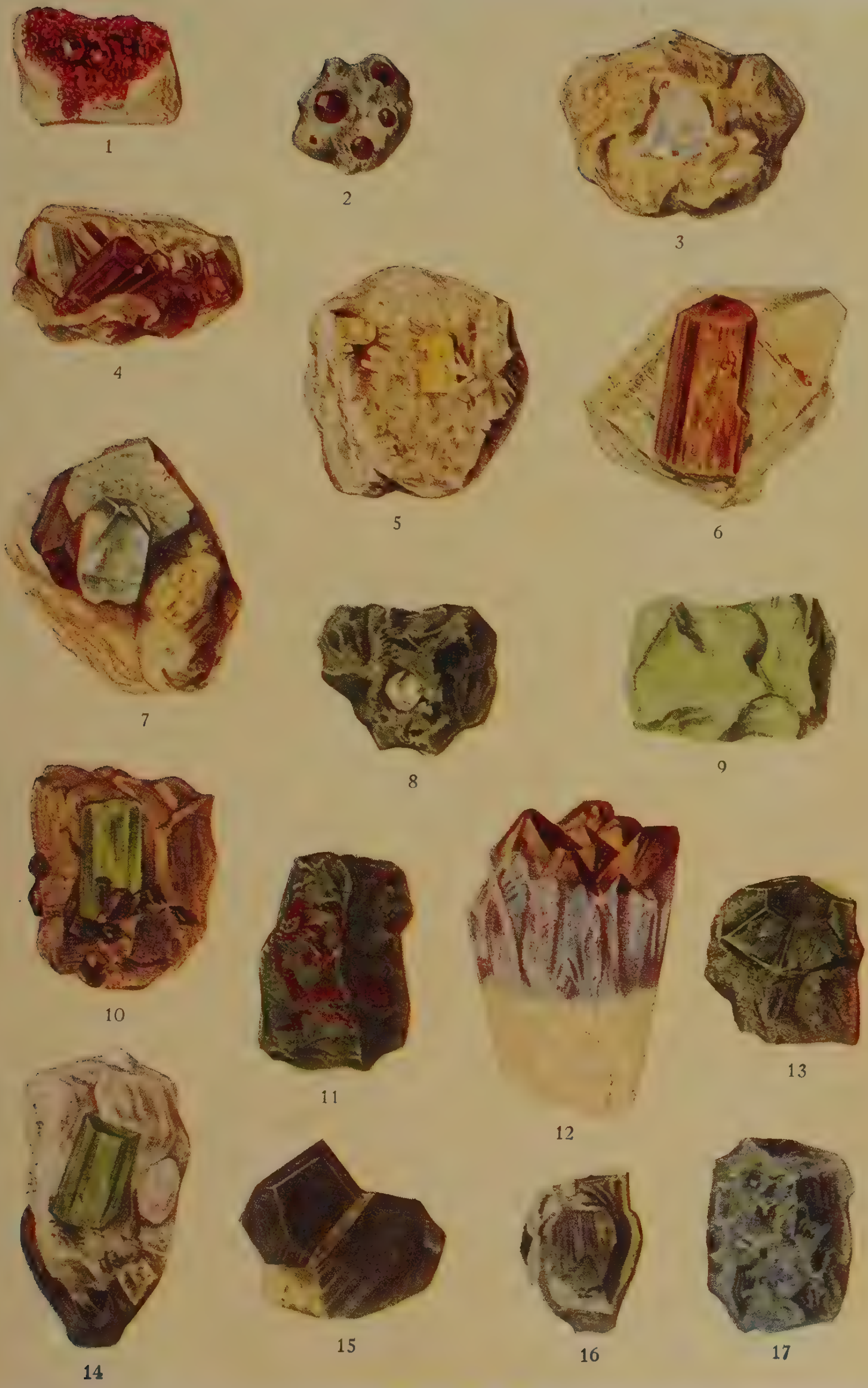
Praxiteles, *prax it'e leez,* one of the greatest sculptors of ancient Greece, a citizen, if not a native, of Athens, flourished about 364 B. C. He and his contemporary, Scopas, stand at the head of the later Attic school, so called in contradistinction to the earlier Attic school of Phidias. Without attempting to rival Phidias in grandeur, Praxiteles chose subjects which demanded a display of the human form, especially in the female figure. The finest is said to have been the Cnidian *Aphrodite* (Venus), whom he was the first to represent naked. The group *Niobe and her Children,* now in existence at Florence, is by some attributed to Praxiteles and by others to Scopas. His two statues of Eros, or Cupid, were also celebrated; one of them, placed in the temple of Eros, at Thespia, and the statue of a satyr, the *Faun* in the Capitol, were regarded by Praxiteles, according to Pausanias, as his finest works. Among his works were statues of Apollo, Dionysos and Demeter, in marble and in bronze, which served as models to succeeding artists. Quite recently a marble statue of Hermes by Praxiteles has been discovered at Olympia. The characteristics of the works of Praxiteles are beauty, grace and delicacy.

Preb'le, Edward (1761–1807), an American naval officer, born in Portland, Maine. He served in the Massachusetts marine during the Revolution and won distinction for his daring. He became a captain in the United States navy soon after its organization in 1799, and during the war with the Barbary pirates he commanded the American fleet which bombarded, with great effect, the port of Tripoli. However, in 1804 he was superseded and returned to the United States, where he retired, after receiving a medal and a vote of thanks from Congress.

Preble, George Henry (1816–1885), an American naval officer, born in Portland, Maine. He enlisted in the navy in 1835, served during the Mexican War and accompanied Commodore Perry in his expedition to Japan. During the Civil War, in command of the *Katahdin,* he was present at the capture of New Orleans, later commanded a vessel in the blockade of Mobile Bay and was dismissed from the service for allowing the *Florida* to escape, but was reinstated. In the latter part of 1864 he coöperated with Sherman on the coast, and after the war he was given command of navy yards in various parts of the country. He retired in 1878, with the rank of rear admiral.

Precession, *pre sesh'un,* **of the E'quinoxes,** a slow motion of the line of intersection of the celestial equator, or equinoctial, and the ecliptic, which causes the positions occupied by the sun at the equinox to move backward or westward at the mean rate of 50.25″ per year. This motion of the equinox along the ecliptic carries it, with reference to the diurnal motion, continually in advance upon the stars; the place of the equinox among the stars, with reference to the diurnal motion, thus precedes at every subsequent moment that which it previously held, hence the name. This sweeping round in the heavens of the equinoctial line indicates a motion of the axis of rotation of the earth, such that it describes circles round the poles of the ecliptic every 25,791 years. From the precession of the equinoxes and nutation in combination, the axis follows a sinuous path, instead of a circle, about the pole of the ecliptic (See Nutation). At present the vernal equinoctial point is in the zodiacal sign Pisces, and it is moving toward the sign Aquarius.

Precious Stones or **Gems,** stones of small size, greatly esteemed for their beauty. They are sometimes found crystallized in regular shapes and with a natural polish, but they are more commonly of irregular shapes and have rough coats. The term *gem* often denotes more particularly a stone that is cut, polished or engraved, and it also includes pearls and various artificial productions. The most valuable gems are diamonds, emeralds, rubies, sapphires, opals and turquoises. Of less value are the garnet, the almandine, the tourmaline, the topaz, the amethyst, the chrysoprase, the chrysoberyl, the



PRECIOUS STONES

1, Garnet.
2, Almandine.
3, Opal.
4 and 15, Tourmaline.
5, 6 and 7, Topaz.
8, Diamond.
9, Chrysoprase.
10, Aquamarine.
11, Heliotrope.
12, Amethyst.
13, Chrysoberyl.
14, Emerald.
16, Turquoise.
17, Azurite.

aquamarine, the heliotrope and the azurite. Agate, lapis lazuli and cornelian can scarcely be called gems.

In art and archaeology, the term gem is usually applied to a precious stone cut or engraved in ornamental designs or with inscriptions. Stones on which the design is raised above the general surface are called *cameos*; those having the design sunk below the surface are called *intaglios*. Early specimens of cut gems are seen in the scarabaei, or beetle-shaped, signets worn in rings by the ancient Egyptians. Among the Greeks, Etruscans and Romans, gem sculpture held a high place, reaching its highest point under Augustus. Modern gem engraving dates from the beginning of the fifteenth century, the chief seats of the art being Italy and Germany. Rome is now the headquarters of the seal-engraving art.

The tools of the engraver consist of a lathe and a series of little rods, with heads of different shapes, all of which can be adjusted to the lathe. The axis of the lathe is pierced at the center with an orifice, into which the tools for cutting the stone are firmly fixed by means of a screw. The engraver wets the extremity of the mounted rod with diamond dust, made into a paste with olive oil, and as the wheel is in motion he applies the stone, firmly cemented to a piece of reed, to the revolving tool. The diamond dust enables the tool to cut into the stone with ease. As the design is frequently very elaborate and of the greatest delicacy, the tools are necessarily multiform. The stones used for cameo cutting often exhibit layers of different colors, so that the raised design has a tint distinct from the ground. Intaglios are very often executed in transparent stones, and the subjects treated in this manner are more limited in number. Since 1870 the art of engraving gems has declined, and at the close of the nineteenth century there was little demand for cameos or intaglios. See GEMS, ARTIFICIAL.

Preëmp'tion, a right given under early public land laws to citizens of the United States, by which they could buy quarter-sections of the public land for a nominal price, by complying with certain conditions. A citizen who entered a preëmption claim was given preference over all other persons. The preëmption laws differed from the homestead laws in not requiring occupation or cultivation. They were repealed in 1891. See HOMESTEAD LAWS; LANDS, PUBLIC.

In international law, preëmption is the right of one nation to seize property belonging to another nation, while it is being shipped across the former's territory. The right is used only in the case of property that is or may be contraband of war, and full value is given to the owner of the property. See INTERNATIONAL LAW; CONTRABAND.

Pren'tice, GEORGE DENISON (1802–1870), an American journalist, born at Preston, Conn. He graduated at Brown University and was admitted to the bar, but never practiced law. He was the first editor of the *New England Review*, but in 1830 went to Kentucky, where he spent the rest of his life. He established the Louisville *Journal*, and by his satire and political ability he made it the foremost Whig newspaper in the West. Its influence probably did much to prevent Kentucky's secession at the beginning of the war. He became famous by practically originating the short, witty paragraph. He was a vigorous partisan, and his propensity for dueling was a common jest. Much of his verse and wit has been collected in book form. His campaign life of Clay was once popular.

Pren'tiss, BENJAMIN MAYBERRY (1819–1901), an American soldier, born at Belleville, Va. (now West Virginia). He removed to Illinois, entered the state militia, served against the Mormons and later took part in the Mexican War. In the Civil War, he entered the army as colonel of an Illinois regiment and soon became brigadier general of volunteers, with command of Cairo, an important military center. He was superseded by Grant. Later he fought at Shiloh; he bore the brunt of the assault, and after a spirited contest he was compelled to surrender. After being exchanged, he became a major general of volunteers and took part in the western operations, but resigned his commission in October, 1863.

Prentiss, SARGENT SMITH (1808–1850), an American lawyer and orator, born at Portland, Maine. He graduated at Bowdoin College and settled at Natchez, Miss., where he was admitted to the bar in 1829. He removed to Vicksburg and soon became one of the most prominent lawyers in the South. He served for a time in the state legislature and for one term in Congress, but in 1842 withdrew from public life. Few of his speeches are preserved, though they were considered by eminent critics the equal of the addresses of Everett and Webster.

Preposition, *prep o zish'un*, in grammar, a part of speech that introduces a phrase modifier and shows the relation between the principal word of the phrase and the word the phrase modifies.

Pres'byter, an office bearer in the early Christian Church, the exact character and position of whom is differently regarded by different authorities. Presbyterians maintain that originally *bishop* and *presbyter* were one and the same; Episcopalians declare that from the first they were different, as was certainly the case in very early times. By the end of the second century the presbyters held a position intermediate between that of bishop and deacon and represented the priests, or second order of clergy.

Presbyte'rians, a class of denominations whose churches are governed by presbyters, or elders. The officers of a Presbyterian church consist of the pastor, elders and deacons. The pastor, together with the elders, looks after the spiritual affairs of the church, and the deacons look after the financial affairs. The pastor and elders constitute a *session,* which has power to admit and to discipline members. The session is under the control of a *presbytery*, which is composed of the ministers and one or more elders from each church in a given district. Presbyteries combine to form a *synod*, and, controlling all, is the *general assembly*, which meets annually and to which synods can appeal certain cases.

Calvin (See CALVIN, JOHN) is considered by some to be the originator of this form of church government, though elders constituted the ruling body among the Waldenses (See WALDENSES). Presbyteries were formed in England during Elizabeth's reign, though much against her will. The Presbyterian creed, confession of faith and form of church government and directory for worship were formulated by an assembly in 1647 and approved by Parliament in the same year, but they were never established in the Church of England. Presbyterianism was established in Scotland in 1560 under the leadership of John Knox (See KNOX, JOHN), and in 1592 it was ratified by Parliament. Presbyterians were among the early New England colonists, and many of them settled about Boston and formed the majority of the colony of Massachusetts Bay. The first American presbytery was organized in 1707, the synod of Philadelphia was formed in 1716 and a general assembly was organized in 1788.

There are several branches of the Presbyterian Church. The Cumberland Presbyterian Church was organized in Tennessee in 1810, as a result of a revival movement, in which, owing to the scarcity of ministers, lay preachers were engaged. This led to the organization of a new body, which adopted the Westminster Confession of Faith, with a few changes, and maintained an independent existence well into the twentieth century. In 1905 it supported 2986 churches and 1649 ministers and had a membership of 186,000. In May, 1906, at the time of the meeting of the general assemblies of the Cumberland Presbyterian Church and the Presbyterian Church in the United States of America, a resolution of reunion was passed by both organizations, whereby the two bodies became one, as of old. The original church in the United States divided on the question of slavery just before the outbreak of the Civil War, and the United Synod of the Presbyterian Church South was organized. The Presbyterian Church of the Confederate States was also organized in 1861, and since the Civil War it has been known as the Presbyterian Church of the United States. It has a strong following in the South. The United Presbyterian Church of North America is distinguished by using only the Psalms in song; previous to 1881 it permitted no musical instrument in its churches. The Reformed Presbyterian Synod of Scotland organized a presbytery in Philadelphia in 1798 and still has some members in this country. The members of this branch of the church refuse to serve on jury, to enlist in the army or to vote at political elections. In 1902 the general assembly of the Presbyterian Church ratified a report which radically changed some articles of the creed. The Bible is considered the supreme standard of the Church, and whoever accepts the confession of faith does not necessarily accept every word and every phrase of it. In the revision, the doctrine of predestination was modified so as to embody the idea that God loves all mankind and that no man is condemned, except for his own sin; the article concerning infants who die before baptism was modified to embody the idea that all who die in infancy are saved by Christ, through his spirit. In 1907 the membership of all the Presbyterian churches in the United States was 1,723,871.

Pres'bytery, the pastors of all the churches of any particular Presbyterian denomination within a given district, with their presiding elders, who form a judicial body that ranks below the synod and above the session. The functions of the presbytery are, to grant licenses to preach the gospel and to judge of the qualifications of such as apply for them; to ordain ministers to vacant charges; to judge in cases of reference for advice and in complaints and appeals which come from the church sessions within the bounds of the presbytery, and generally to superintend whatever relates to the spiritual interests of the several congregations under its charge, both in respect to doctrine and discipline. Appeals may be taken from the presbytery to the provincial synod and thence to the general assembly.

Pres'cott, Ari., the county-seat of Yavapai co., 137 mi. n. of Phoenix, on the Atchison, Topeka & Santa Fé and the Prescott & Phoenix railroads. The city is on an elevation of over 5000 feet, in a rich mining country, producing gold, silver and copper. Stock raising and lumbering are also important industries. The city has a public library and contains the Saint Mary's Hospital and Home for Children, Saint Mary's Sanitarium, Saint Joseph's Academy and the Saint Xavier's Indian School. Population in 1900, 3559.

Prescott, William (1726–1795), an American soldier in the Revolutionary War. He served in the last French and Indian war, declined an offer of a command in the regular British army and retired to his estate at Pepperell, Maine. Immediately after the Battle of Lexington in 1775, he organized a company of militia and joined the American army at Cambridge. He was at the head of the expedition to fortify Bunker Hill, commanded the American forces on Breed's Hill during the battle of June 16, 1775, and was the last to leave the field after the final British charge. He resigned his commission in 1777, but reentered the army and fought at Saratoga. After the war he served in the Massachusetts legislature.

Prescott, William Hickling (1796–1859), an American historian, born in Boston. He was the grandson of Col. William Prescott, who commanded the American forces at the Battle of Bunker Hill. In 1811 he entered Harvard College. While there he met with an accident by which he lost his left eye, and the other became eventually so weak that during the latter half of his life he could scarcely use it. After spending two years in traveling through England, France and Italy, he returned to America, where he married and set himself assiduously to literary labor. Acquaintance with Spanish literature, which he began to cultivate in 1824, led him to attempt his first great work on Spanish history, the *Reign of Ferdinand and Isabella*, published in 1837. It was received with enthusiasm, both in America and Europe. It was rapidly translated into French, Spanish and German, and its author was elected a member of the Royal Academy at Madrid. Prescott's next work was the *History of the Conquest of Mexico, with a Preliminary View of the Ancient Mexican Civilization and the Life of the Conqueror, Hernando Cortes*, which appeared in 1843 and was received with an equal degree of favor. In 1847 he published the *History of the Conquest of Peru, with a Preliminary View of the Civilization of the Incas*. Eight years later the first two volumes of the long-expected *History of the Reign of Philip the Second, King of Spain*, appeared, and in 1858 a third volume was published; but before the work was completed, Prescott's death occurred, from apoplexy.

WILLIAM H. PRESCOTT

Prescrip'tion, in law, the right or title acquired by use and time. In almost all the states there are statutes regulating prescription. Generally an uninterrupted possession of twenty years is required for the acquisition of rights in real property.

President, *prez'i dent*, the supreme executive officer of the United States. A man to be qualified for this office must be a natural-born citizen of the age of thirty-five years and must have resided fourteen years within the United States. He is elected by the vote of "electors" chosen by the people of each state. In his legislative capacity the president has the power of approving bills sent to him after passing Congress or of returning them to the house in which they originated. In his executive capacity he is at the head of all the administrative activities of the government and is commander in chief of the army and navy. His powers are prescribed in the Constitution. He holds his office for four years and is eligible for reëlection.

In case of death or disability of the president, the vice-president succeeds to the office. On death of both president and vice-president the members of the cabinet succeed to the presidency in the following order: Secretary of State, Secretary of the Treasury, Secretary of War, Attorney-General, Postmaster-General, Secretary of the Navy, Secretary of the Interior. See UNITED STATES, subhead *Government*.

Press, LIBERTY OF THE, the liberty of every citizen to print whatever he chooses, under the limitation of being liable for abuse of that liberty. The right of printing rests on the same abstract grounds as the right of speech, yet it is only since men's views of the just limits of government have become clearer that the liberty of the press has been recognized as a right. The Constitution of the United States and those of many of the states declare for liberty of the press. Among European countries the liberty of the press is most complete among the weaker powers, such as Spain, Turkey, Sweden, Norway, Switzerland and Rumania; in France the press is comparatively free; in England it is practically free, but in Germany, Austria, and particularly in Russia, there are still many restrictions.

Pressburg, *pres'boorK*, a royal free city of Hungary, former capital of the country and the present capital of the County of Pressburg, beautifully situated on the left bank of the Danube and on spurs of the Carpathians. It is one of the finest cities of the kingdom. The most striking building is the ruined royal palace. The cathedral is a large Gothic structure which has of late years been considerably modernized. The Hungarian kings were formerly crowned in this cathedral. The townhall, which dates from the thirteenth century and contains a museum of Roman relics, is also worthy of mention. The manufactures of the city are various and include pastry, tobacco, machinery, leather, champagne and musical instruments. The trade, particularly the transit trade, is extensive, and it consists largely in corn and timber. In 1541, when the Turks captured Buda, Pressburg became the capital of Hungary, and it held this position until 1784. The treaty by which Austria ceded Venice to France and the Tyrol to Bavaria was signed here in 1805. Population in 1900, 61,537.

Pressure, *presh'ur*. See HYDROSTATICS.

Pres'ton, a municipal and Parliamentary borough of England, in Lancashire, 28 mi. n. e. of Liverpool, on the north bank of the Ribble, near the head of its estuary. It has some fine buildings, among which are the townhall, the corn exchange and Saint Walburge's Roman Catholic Church. The original staple manufacture of the town was linen, which is still woven to some extent, but which is now second in importance to cotton, of the manufacture of which Preston is one of the chief centers. The town has also machine shops, iron and brass foundries, railway carriage works, breweries, malt houses and tanneries. Population in 1900, 112,989.

Preto'ria, a city of Transvaal Colony, in South Africa, situated in a fertile valley 30 mi. n. e. of Johannesburg, with which it is connected by rail. The town is well laid out and is irrigated by streams of running water, which border its streets. It has a number of public squares and botanical and zoölogical gardens and also contains the government buildings of the former South African Republic, of which it was the capital. Its commerce is considerable. The city was founded in 1855. Population in 1904, 21,161.

Prevailing Westerlies or **Anti-Trades,** the surface winds of the temperate regions, which in the Northern Hemisphere blow from the west-southwest and in the Southern Hemisphere from the west-northwest. These winds blow over the entire Temperate zones and extend into the Frigid zones. The upper and lower currents in the regions traversed by the westerly winds blow in nearly the same direction, consequently these winds are of greater depth than trades. They are caused by the return current, which starts from the upper end of the ascending current over the belt of equatorial calms. As these currents cool they descend, and by the time they have reached the temperate latitudes they become surface currents. On the sea the prevailing westerlies are quite constant, though subject to more local interruptions than are the trade winds, but on the land they are frequently so modified by local influences that they are extremely difficult to trace. In the Southern Hemisphere, between the 40th and 60th parallels, these winds attain such force that the sailors call them the *roaring forties.* Before the days of steamships, these winds were of great assistance to vessels sailing eastward. See TRADE WINDS; WIND.

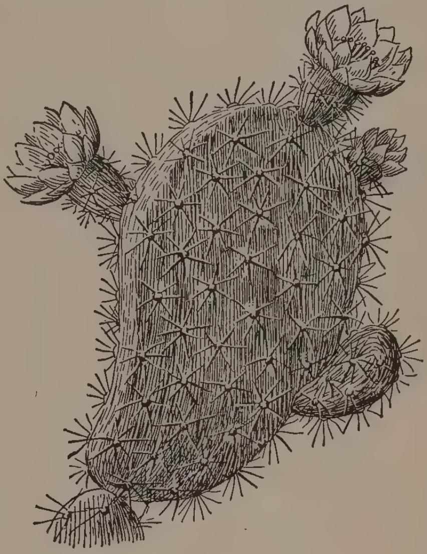
Pri′am, in Greek legend, the last king of Troy, the son of Laomedon. By his second wife, Hecuba, he had, according to Homer, nineteen children, among them Hector, Paris, Cassandra and Troilus. His name has been rendered famous by the tragic fate of his entire family, as a result of the Trojan War. Homer gives no account of the death of Priam, but other poets relate that he was slain at the altar of Jupiter by Pyrrhus the Greek. See TROY.

Pribilof, *pre be lohf′,* **Islands** or **Pribylov Islands,** a group of islands on the coast of Alaska, in Bering Sea. The largest are Saint Paul, Saint George and Walrus islands. They abound in fur seal and are consequently an important center of the seal fishery.

Price, STERLING (1809–1867), an American soldier, born in Prince Edward County, Va., and educated at Hampton-Sidney College. He removed to Missouri in 1831 and was elected to Congress, but resigned and entered the army to serve in the Mexican War. He participated in Kearney's expedition to California and later defeated the Mexicans near Chihuahua. In 1853 he was elected governor of Missouri and served two terms. At the outbreak of the Civil War, he wavered for a time between the Southern and the Northern parties, but finally joined the secessionists, and as major general of the State of Missouri troops he contested the territory of Missouri with the Federals under Fremont and Curtis. He served under Beauregard and Van Dorn around Corinth and in Tennessee, but in 1863 he was transferred to the department west of the Mississippi.

Prickly Ash or **Toothache Tree,** the common name of a North American shrub or small tree, which has leaves resembling the ash and whose bark has a hot, fiery oil that is sometimes used for the relief of toothache.

Prickly Pear or **Indian Fig,** a name given to an American genus of cacti containing about one hundred and fifty different species, most of which grow in the southwestern United States. The common prickly pear is a perennial and bears yearly, between June and October, beautiful, showy, solitary flowers, sometimes red or white, but usually yellow, about three inches in diameter. The stem is composed of flat, oval joints, which grow in zigzag forms and are leafless, but covered with sharp spines. The edible fruit, which resembles a fig or pear, has clusters of prickles on the skin. Some species found in dry, subtropical regions, as the indian fig, yield large crops of nutritious fruit, where few other plants will grow, while other hardier varieties, after the spines have been removed, serve as forage for cattle. Burbank has produced a spineless variety, demonstrating the possibility of greatly improving the plant by cultivation. In dry pastures the prickly pear becomes a nuisance, but it may be eradicated if the field is burned over and the grass encouraged to crowd out the cactus. See COCHINEAL.



PRICKLY PEAR
The cochineal cactus.

Pride's Purge. See RUMP PARLIAMENT.

Priest, in its most general signification, a man whose function is to inculcate and expound religious dogmas, to perform religious rites and to act as a mediator between worshipers and whatever being they worship. In some countries the priesthood has formed a special order, or caste, the office being hereditary; in other countries it has been elective. In sacred history the patriarchal order furnishes an example of the family priesthood. Abraham, Isaac and Jacob performed priestly acts and drew "near to the Lord," as did also Job, and the Arab sheikh to-day unites in his person the civil and religious headship. The Mosaic priesthood was the inheritance of the sons of Aaron, of the tribe of Levi. The order of the priests stood between the high priest and the Levites. In some churches the term *minister* or *pastor* is employed instead of priest. Those Christians, however, who, like the Roman Catholics and Greeks, look upon the eucharist as a sacrifice, regard the priest as performing sacrificial duties and as standing in a special relation between God and his fellow men. The priests of the Church of Rome are bound to a life of celibacy; but in the Greek Church, a married man may be consecrated a priest. In the Anglican and other Episcopal churches, the priests form the second order of clergy, bishops ranking first. Diverse views of the priestly office are held in the Anglican and allied churches.

Priestley, Joseph (1733–1804), an English philosopher and clergyman, born near Leeds. In 1774 he discovered oxygen, which he quickly followed by other important discoveries in chemistry. Among his works are *Experiments and Observations on Different Kinds of Air, The Doctrine of Philosophical Necessity, History of the Corruptions of Christianity, History of Early Opinions Concerning Jesus Christ* and *General History of the Christian Church.*

Prim, Juan, Marquis de los Castillejos, Count of Reus (1814–1870), a Spanish statesman and field marshal. He assisted greatly the movement which ended in the downfall of Queen Isabella, and in the new government he was appointed minister of war. The crown of Spain he first offered to Leopold of Hohenzollern, and this precipitated the Franco-German War. He afterwards procured the election of Amadeus, duke of Aosta, to the throne, but the day that Amadeus landed in Spain, Prim was killed by an assassin.

Pri′mates, the highest order of mammals. In it are included the squirrel-like lemurs, the apes and monkeys and, lastly, man. The primates may be described as hairy mammals, generally living in trees, with five digits on each limb, all provided with flat nails instead of claws. Their fore feet are usually grasping hands, and their hind feet are often used for grasping, though in some instances solely for walking. The first suborder includes the lemurs; the second, the apes, who are different not only in mode of life, but also in structure. The apes are separated into two divisions, based principally upon the character of the nostrils, though there are other distinctions. By this classification the anthropoid apes and man belong to the second division, those whose nostrils open downward and are close together (See Ape). The orang-utans and the chimpanzees are the most nearly related to man in structure, the former resembling him in the number of ribs and in the form of the brain, the latter in the proportion of the limbs to the body. The greatest difference between man and the apes is in the size and structure of the cerebrum and forebrain, which in man is twice as large as in the gorilla. Moreover, in the ape the cerebrum is comparatively smooth, while in man it has a great number of folds, which marks the increased intelligence of the latter. According to Professor Haeckel, the only characteristics which differentiate man from the apes are his erect walk, the modification of his fore and hind limbs, the existence of articulate speech and the faculty of reason. See Aye-Aye; Baboon; Lemur; Marmoset; Monkey.

Prime Number. See Number.

Primogeniture, *pri mo jen′e ture,* the right of the eldest son and those who derive through him to succeed to the property of an ancestor. The institution existed among the ancient Hebrews, but was particularly developed under the feudal system. Before the Norman conquest the descent of lands in England was to all the sons alike, but later the right of succession by primogeniture came to prevail almost everywhere. It is entirely abolished in France and Belgium, but it prevails in some degree in most other countries of Europe. The rule operates only when a person dies without will, and is as follows: The eldest son is entitled by law to the whole real estate. If he is dead, but has left an eldest son, the latter succeeds to his father's right. If the whole male line is exhausted, then the daughters succeed—not in the same way, however, but jointly, except in the case of the crown, to which the eldest succeeds. In the United States no distinction of age or sex is made in the descent of estate. See Entail.

Primrose, a genus of beautiful Alpine plants, in all of which the flowers rise on slender stems from a group of broad hairy leaves. There are about 150 species, all of which are natives of Asia or Europe, except two unimportant species of North America. The *common primrose* has pale yellow blossoms and grows abundantly in the woods, meadows and hedges of Europe. The English *cowslip* is very similar to the common primrose, except that the flowers are brighter yellow. In the United States the primrose cultivated so extensively is a Chinese variety. It blooms frequently and has large clusters of fragrant flowers, varying in color from delicate shades of pink to violet and purple. Several Japanese and other varieties are cultivated in gardens as ornamental plants.

COMMON PRIMROSE

Prince, literally, one who holds first place. In modern times the title of prince (or princess) is given to all sovereigns generally, as well as to their sons and daughters and nearest relations. In Germany there is a class of sovereigns who bear the title of prince, *Fürst,* as a specific designation; members of royal families are called *Prinzen.* On the Continent there are many ancient families not immediately connected with any reigning house, who bear the title of prince, while in England dukes and earls are sometimes called princes.

Prince Edward Island, an island forming a province of the Dominion of Canada, located in the Gulf of Saint Lawrence and separated by Northumberland Strait from New Brunswick, on the east, and Nova Scotia, on the south. Its greatest length, from east to west, is about 130 miles; its breadth varies from 4 to 34 miles, and its area is 2133 square miles. The coast line presents a remarkable succession of large bays and projecting headlands. The surface undulates gently, nowhere rising so high as to become mountainous, or sinking so low as to form a monotonous flat. The island is naturally divided into three peninsulas, and the whole is well suited for agriculture and pasturing, the forests now being of comparatively limited extent. The prevailing rock is a reddish sandstone, but a large part of the surface is evidently alluvial. The climate is mild; winter is free from damp, unwholesome chills; and summer, without being oppressively hot, is fitted to promote the growth of all the ordinary cereals. Sheep, cattle and horses are reared in considerable numbers; cod, mackerel, herring, oysters and lobsters form the most productive part of the fisheries. The manufactures are chiefly confined to linen and flannels for domestic use. The exports consist of timber, agricultural produce and live stock, and the imports include dry goods, hardware, cordage and iron.

A railway runs from one end of the island to the other. The capital is Charlottetown. The public affairs of the island are administered by a lieutenant governor, nominated by the Crown, who appoints an executive council of nine members. There is also a legislative assembly of a single house, elected by the people. There is an excellent educational system, the elementary schools being free. The island is supposed to have been discovered by Cabot in 1497. It was first colonized by France, was captured by the British in 1745, was restored and recaptured and finally in 1873 it was admitted to the Dominion of Canada. Population in 1901, 103,259.

Prince of Wales. See Wales, Prince of.

Princeton, Ind., the county-seat of Gibson co., about 27 mi. n. of Evansville, on the Southern and the Evansville & Terre Haute railroads. The city is in an agricultural and coal-mining region, and it contains large lumber and brick yards, shops of the Southern railroad and several factories. It has thirteen churches, a business college, a high school and a Carnegie library. The place was settled in 1804 and was chartered as a city in 1884. Population in 1900, 6041.

Princeton, N. J., a borough of Mercer co., on the Pennsylvania railroad, about 50 mi. s. w. of New York. It is famous chiefly as the site of Princeton University (See Princeton University), but it has also a seminary and other educational institutions. The university buildings are the most noteworthy buildings of the city. A famous battle of the Revolutionary War was fought at Princeton (See Princeton, Battle of). Population in 1905, 6029.

Princeton, Battle of, an important battle of the Revolutionary War, fought January 3, 1777, about a week after the Battle of Trenton. On January 2, the American army was established on the bank of the Assunpink River; Cornwallis, with a large force, was upon the opposite shore, preparing to make a general attack the following morning. Washington evaded battle by moving his whole army about Cornwallis's position to the northward, leaving a few men to build fires and make noise about the site of his camp, thus to deceive the British commanders. He soon met a force of about

2000, coming from Princeton to join Cornwallis. After a hard battle the British were routed and Washington took up a strong position at Morristown, while Cornwallis retreated northward through New Brunswick to New York, thus practically abandoning the State of New Jersey.

Princeton University, a university located at Princeton, N. J., founded by the Presbyterian Synod of New York in 1746 as the College of New Jersey. The school was originally established at Elizabethtown. In 1748 it was moved to Newark, where it remained until its permanent location at Princeton. On the one hundred fiftieth anniversary of its founding, the college of New Jersey became Princeton University. As now organized, the university has scientific and academic courses of study, requiring four years for completion, and graduate courses, which constitute the university work in all departments. It maintains 9 laboratories, 2 astronomical observatories, and museums of geology and archaeology, biology, morphology and historic art. The general library contains over 291,000 volumes, and there are special libraries connected with the laboratories. The faculty numbers about 150, and the enrollment is nearly 1500. The endowment is about $3,000,000. While non-sectarian, this school is conducted under the auspices of the Presbyterian Church, under which it has acquired a leading influence.

Printing, the art of stamping letters, figures or other characters upon paper, cloth or other material. In its ordinary sense the term means the impressing of characters upon paper.

HISTORY. The origin of printing is unknown. It is probable that the Egyptians and Babylonians engraved characters on precious stones, which were set in rings or other jewels and used for the purpose of impressing their signatures upon official documents. Some assert that the Romans knew the art of printing, but would not use it because the authorities believed that the spreading of intelligence would lead to uprisings among the people. As far as definitely known, however, the first printing was done by the Chinese during the last century before the Christian era. These people used engraved blocks, instead of type, and they still continue to print by this method. There has been a great deal of dispute over the invention of printing with movable type, as we know it to-day. The Germans claim that Johannes Gutenberg was the inventor, while the Dutch assert that this honor is due to Laurens Coster of Holland. The weight of evidence seems to be in favor of Gutenberg, and he is now generally considered to have been the inventor, since he was the first to establish printing on anything like a scientific basis. See COSTER, LAURENS; GUTENBERG, JOHANNES.

The exact date of the invention of printing is not known, but it occurred sometime between 1424 and 1448. Gutenberg's printing office was at Mainz, Germany, and his first book was a copy of the Old Testament, which was completed between 1450 and 1455. This work is now known as the Mazarin Bible, because, years afterwards, a copy of it was found in the library of Cardinal Mazarin. After Gutenberg's death the work was continued by John Faust, who kept the process secret until Mainz was captured in a war and the workmen were obliged to flee. These printers soon set up establishments in other cities, and by the end of the fifteenth century there was a printing office in nearly every important city of Europe. Printing was introduced into England by William Caxton in 1477.

The first printing press in America was set up in the City of Mexico sometime between 1540 and 1550. The first press in the United States was established at Harvard College, Cambridge, Mass., in 1638. This press is of great historic interest. The first article printed on it was the *Freeman's Oath*, the second was an almanac and the third was the first edition of John Eliot's famous *Indian Bible*. This was also the beginning of what is now the University Press, one of the largest and best-known printing establishments in the world. Presses in other colonies followed, and within the next hundred years each had one or more printing establishments. After the Revolutionary War the printing industry in the United States started anew, and it has continued to keep pace with the growth of the country.

PROCESSES. Printing includes three processes —composition, make-ready, or imposition, and press work. As the first is now practiced it is necessary to add to these, stereotyping and electrotyping, each of which is described under its appropriate title.

Composition. By composition is meant typesetting, which is the first step in printing. The typesetter is called a *compositor*, and the stand which holds his type is called a *case*. When the work is done by hand, the compositor sets the type in a small metal frame, called a *stick*. This holds about fifteen lines of ordinary type, and when it is filled the compositor places the type in a long, narrow frame with a metallic bottom and three sides, called the *galley*. After the type for the copy has been set, a rough copy, called the *proof*, is taken from the galley. This is read and corrected, and the copy is given to the compositor, who proceeds to correct his errors. When this has been done, the type is ready for the next process. For machine composition see LINOTYPE; MONOTYPE.

Make-ready, or Imposition. This includes arranging the type into pages, putting in the head lines, page numbers and running titles. It is done on a stone or on an iron-topped table, and the workman who does it is known as the *stone man.* The type for each page is held together by a string that is wound around it. When made into pages, it is placed in an iron frame, called the *chase,* and is wedged in so tightly that the single types cannot fall out when the chase is moved. The chase and type, when arranged for the process, constitute the *form.* The size of the form varies from 1 page to 128 pages, according to the size of the page and the work. The most common sizes contain 16 or 32 pages. The pages are so arranged that the right numbers will face when the sheet is folded. Only small editions of papers and circulars are now printed directly from type. All others are printed from stereotype or electrotype plates, and when this is done the type, as soon as made into pages, is sent directly to the foundry. The plates are then placed in the form. See ELECTROTYPING.

Press Work. The actual printing is done on the printing-press, which is a machine for pressing the paper down upon the face of the type. The type is inked by running rollers over the form just before the paper is pressed down upon it. The paper is fed into the press in single sheets or from a roll, according to the plan of the press and the kind of printing. Circulars, books, pamphlets and country newspapers are printed from sheets, but large newspapers and magazines which have a large circulation, are printed from a roll. As the roll is printed it is made into sheets, which are folded by a machine. The modern newspaper and magazine presses do this work very rapidly, some of them having a capacity of 150,000 copies of twelve-page papers per hour. Circulars, job work and most country papers are printed on small presses that may be run by power or by hand, as desired.

COLOR PRINTING. Printing-presses are constructed which will print in three or more colors, and by their use inexpensive colored pictures are produced. Many of the large city dailies now have one section of their press fitted for color work, and on this the colored supplements and covers of the Sunday edition are printed. Both color printing and plain printing are often done on one of these presses at the same time, and some of them can print as many as eleven or twelve colors. In the three-color process, which produces pictures of high grade, the three primary colors—red, blue and yellow—are used, and the other colors are produced by printing these one over the other, different proportions being used for different tints. Three halftones of the picture are prepared, each representing the part that is to receive a certain color, and three impressions are required to complete the picture. Most colored pictures in books and magazines are made by this process. See LITHOGRAPHY, subhead *Color Lithography.*

Printing and publishing in the United States rank fourth in the great manufacturing industries. The value of the yearly output of books, papers and other printed matter is over $350,000,000. See NEWSPAPER; PRINTING PRESS; TYPE.

Printing Press, a machine for printing upon paper or other material. The necessary parts of a printing press are the *bed,* for holding the type form; a device for inking the type; a *platen,* for pressing the paper upon the type; the frame for holding these parts, and the necessary gear for operating them.

The first printing press was a modification of the wine press and was a very crude affair, consisting of a bed, upon which the forms were placed; a board, for a platen, and a screw, for pressing the platen down upon the type. The frame was of wood and rudely constructed. The type was inked with a leather ball, stuffed with cotton. The paper was then laid upon the form and the platen placed over it, after which the form was shoved under the screw, which was turned with a lever. This was the press designed by Gutenberg and used for several centuries with little or no improvement. The first improvement in Gutenberg's press consisted in substituting iron for wood in making the frame; the next was in adding a spring to lift the platen when the screw was released, and the next, and by far the most important, in substituting a lever for the screw in operating the platen. Inking devices and the crank and pulley arrangement for moving the form were added, and this pattern of press is still in common use in country offices and for printing photo-engravings and other illustrations.

The cylinder press was the next great improvement in the printing press. It was invented by Friedrich Koenig in 1806 and was first used in 1814 in printing the London *Times*. This press takes its name from the large cylinder which constitutes the platen. As it revolves this cylinder seizes the paper and impresses it upon the type. The form is placed on a movable bed, so that it moves back and forth under the platen and the ink rollers at each impression. A good press of this pattern will make from 1500 to 2000 impressions per hour. Double cylinder presses are sometimes constructed with a device for turning the paper, so that both sides of the sheet are printed without rehandling. The old-style cylinder press is a common object in all country printing offices.

The most recent development in the printing press is in the invention and perfection of what is known as the web perfecting press, invented by Mr. Richard Hoe of New York in 1871. In presses of this pattern the forms are cylinders, and the stereotype plates are made in half-cylinders and clamped in position on the press. These cylinders are so placed that they print both sides of the sheet at once, and also print the paper from a roll, or web. The press is so planned that any number of parts can be added, so that a quadruple, a sextuple or an octuple press can be constructed, as desired. These additions are made either by setting the presses side by side, or by placing them one above the other, which is the more common plan. The work of one of these presses is so rapid that it is impossible for the untrained observer to follow the paper as it rushes through the machine. When running at full speed the roll of paper is unwound and printed at the rate of 35 miles per hour (See NEWSPAPER, subhead *Printing*). Many of these presses are also arranged so that a portion of the paper can be printed in colors.

While the web perfecting press was constructed for the purpose of printing large daily papers, it has since led to the construction of other patterns for the use of large magazine and book establishments, and now some of the best work in the country is produced on presses of this pattern. See PRINTING.

Prism, *priz'm*, a geometric solid, two of whose faces, called *bases*, are equal parallel polygons, and whose other faces, called *lateral faces*, are parallelograms. When the edges of the lateral faces are perpendicular to the bases, the prism is a *right prism*; otherwise it is *oblique*. The area of the surface of a prism is equal to the perimeter of the base (that is, the sum of the length of its sides) multiplied by the altitude (that is, the perpendicular distance between the two bases). The volume is equal to the area of one base multiplied by the altitude. In optics, the prism is a transparent body, with two plane faces not parallel to each other. It is usually made of glass.

Prison, *priz'un*, a house in which a person is confined and thereby deprived of his personal liberty; especially, a building for the detention, confinement or safe custody of criminals and accused persons. Imprisonment is now one of the recognized methods of judicial punishment; but formerly it was employed for purposes of injustice and oppression, through the inefficiency of the law to protect those who were offensive to the powerful. Even in Great Britain, where the laws have always condemned the incarceration of the innocent, the prison was, by the connivance of the authorities, made subservient to gross injustice and cruelty. In the eighteenth century the proper regulation of imprisonment began.

In the early part of the nineteenth century the most advanced examples of prison discipline and construction were to be found in the United States, and although in the second half of the century this prominent position has not been maintained, the improvements initiated in America were vastly important. The Philadelphia Society for Assisting Distressed Prisoners was founded in 1776—the first of the kind in the world—and, though dissolved during the war, it was reorganized in 1787 and is still at work. Large measures of reform were quickly secured; by 1790 the principle of separation was recognized, and in 1794 all convicts were separated and secluded; in the latter year, also, capital punishment was abolished in Pennsylvania for all crimes but murder in the first degree. It thus became necessary to devise some substitute for capital punishment. At the Eastern Penitentiary, at Philadelphia, opened in 1829, the so-called "Pennsylvania system" of permanent seclusion of convicts was carried out. Evil effects arose from the rigorous application of this principle, and even at Philadelphia the system is not now strictly enforced, while in all other American prisons what is known as the "Auburn system"—silent labor in association by day, and separation by night—has been adopted. In the

Southern states, prisoners are sometimes leased out to the highest bidders for the terms of their sentences; but this system, which condemns the convicts to a slavery that is not modified even by considerations arising from personal ownership, is being abandoned. The first place of detention for juvenile delinquents was opened in New York, in 1825; the first reformatories on the cottage, or family, system were established in Ohio—for boys at Lancaster in 1858, for girls at Delaware in 1878. In 1877 the Elmira (N. Y.) Reformatory was opened, at which a now famous system has been adopted for the treatment of first offenders under thirty years of age; the principal features are indeterminate sentences, the classification of prisoners into three classes under the mark system and discharge upon probation, under supervision.

Many indulgences are granted to the prisoners to induce them to work, so that the penal element of a sentence of imprisonment is almost entirely absent. It may be added that crime has increased in the United States in a ratio far in advance of the growth of population; in 1850 the prisoners represented 1 in 3442 of the population, in 1890 they were 1 in 760.

Prisoners of War, persons captured from the enemy in time of war. In ancient times prisoners of war became the slaves of their captors, and even yet it is a recognized principle among nations that all the inhabitants of a vanquished town, state or nation become the absolute property of the victors, though it is hardly necessary to say that the principle is now no longer acted upon by civilized nations. Prisoners of war are now either kept until the war is over, are released on parole or are exchanged for prisoners taken by the other side.

Pri′vateer′, a vessel of war, owned and equipped by private individuals, to seize or plunder the ships of an enemy. Such a vessel must be licensed by a government and must be under a letter of marque, otherwise it is a pirate. In 1818 Congress passed a law forbidding enlistments on foreign privateers. By the Declaration of Paris, 1856, the great powers of Europe mutually agreed to abandon the right to arm privateers in case of war; but several nations, the chief ones being the United States and Spain, have not agreed to this, and it is doubtful whether it will be always strictly acted upon even by the parties to the declaration. The practice of privateering, while useful to maritime countries, and necessary at one period to England, is very harassing to trade and gives endless opportunities for private plunder.

Priv′y Council, the council of state of the British sovereign, convened to discuss matters connected with the public service and for the honor and safety of the realm. As it exists at present, the number of members of the privy council is indefinite; they are nominated by the sovereign at pleasure. The list of privy councilors now embraces, besides the members of the royal family and the members of the cabinet, the archbishops and the bishop of London, the great officers of state, the lord chancellor and chief judges, the speaker of the House of Commons, the commander in chief and some other persons. Officially at the head is the lord president of the council, who is appointed by patent, and who manages the debates and reports them to the sovereign. See ENGLAND, subhead *Government.*

Privy Seal, a seal appended by the British sovereign to certain grants or documents. Since the time of Henry VIII the privy seal has been the warrant of the legality of grants from the crown and the authority for the lord chancellor to affix the so-called *great seal*; such grants are termed *letters patent.* The officer who has the custody of the privy seal is called *lord privy seal*, and is the fifth great officer of state, having also, generally, a seat in the cabinet.

Pro′bate, the proof before an officer, authorized by law, that an instrument offered to be recorded is the last will and testament of the deceased person whose act it is alleged to be. The party presenting and upholding the instrument is termed the *proponent,* and the party disputing, if any, the *contestant.* In the United States, generally speaking, proofs cannot be taken until notice has been issued by the judges to all the parties interested to attend. On the return of the notice, the witnesses are examined and the trial proceeds before the court. If the judge, when both parties have been heard, decides in favor of the will, he admits it to *probate*; if against the will, he rejects it and pronounces the sentence of *intestacy.* The functions of this branch of the judiciary are confined to deciding on the authenticity of wills and upon the proper persons to act as administrators when no will exists or when no executors are named. See WILL.

Pro′bus, MARCUS AURELIUS, Roman emperor from 276 to 282. At an early age he attracted the notice of Valerian, by whom he was placed at the head of a legion; and the brilliancy of his subsequent conduct in the African, Persian, Arabian and Germanic campaigns brought him into still more prominent notice. On the death of the emperor Tacitus, in 276, the army hailed him as emperor, a selection immediately confirmed by the Senate and people of Rome. His chief struggle during his reign was to guard the frontiers of the Empire against the barbarians, a task which he carried out with great success, both in Europe, Asia and Africa. He settled large numbers of barbarians in the frontier provinces and admitted them to his legions and devoted himself to the making of roads and draining of marshes. His skilful administration and public virtues did not, however, protect him from enmity; and after a short reign he was murdered in a military insurrection.

Proce′dure, in law, the method of proceeding in a lawsuit throughout its various stages, civil procedure being the rules for conducting a suit in civil law, and criminal procedure being the rules for conducting a criminal case.

In the United States, when redress is sought for a civil injury, the injured party brings an *action* against the offender, who thereby becomes the *defendant*, the complainant being known as the *plaintiff*. The action is begun by issuing a *writ of summons* (See WRIT), commanding the defendant to *appear* in court. If he fail to do so, an *appearance* is entered for him by the plaintiff. When both parties have entered an appearance they are said to be *in court*, and the suit may be commenced. The next stage is the *pleadings*, or the statements in legal form of the position of the two parties to the suit. Next the *issue* is argued. This may be a matter of law, the facts being admitted, in which case it is called a *demurrer*, or it may be a question of fact. In the former case the decision rests with the *judge*; in the latter, with the *jury*. In a jury trial, after the evidence has been submitted, the judge sums up the law bearing upon the issue, the jury retires, enters a *verdict*, that is, comes to a conclusion, and the judge then pronounces *judgment*, that is, announces the decision and the consequences which the court has fixed to the act.

In criminal cases the first step is the *arrest* of the one charged with the crime; that is, he is taken into custody of the law. He is then brought before a judge or magistrate to be *examined*, and he may be held to answer for his action to the grand jury (See JURY AND TRIAL BY JURY), or he may be dismissed for lack of evidence; or, if the grand jury has already entered *indictment*, he may be held for *trial* before a *petit jury*. Pending trial, he is either allowed his freedom upon giving *bail*, or bond, for his appearance, or he is committed to jail. If the grand jury enters indictment, the prisoner is held for trial before a petit jury; if found not guilty, he is discharged; if found guilty, he is sentenced to punishment. In the latter case an *appeal* may be granted, that is, the right of a defeated party to carry his case to a higher court for determination, on account of a flaw in the conduct of the case at the earlier trial. See CRIME.

Proc′ne. See PHILOMELA.

Proc′ter, ADELAIDE ANNE (1825–1864), an English poet, born in London. Assuming the name of Mary Berwick, she became a contributor in 1853 to *Household Words*. This periodical was edited by Charles Dickens, who became interested in the young poet and aided in gaining for her public recognition. Later poems were published in *All the Year Round*. A collection of her verses, nearly all of which had appeared in these two magazines, was issued in 1858. A later edition of them contains her biography, written by Dickens.

Procter, BRYAN WALLER (1787–1874), an English poet. His first published work was entitled *Dramatic Scenes and Other Poems* and appeared in 1819, under the pseudonym of Barry Cornwall, which remained Procter's pseudonym in his future writing. As this volume was well received, he published shortly thereafter *A Sicilian Story* and *Marcian Colonna*. In 1812 he produced a tragedy, *Mirandola*, which was performed with great success at Covent Garden. Procter also wrote several other books of poetry and a variety of prose works, the most interesting of which was his *Memoir of Charles Lamb*, of whom he was an intimate friend. Procter's poems exhibit much delicate grace and refinement, but they have never attained great popularity. His best-known song is *A Lost Chord*.

Proc′tor, RICHARD ANTHONY (1837–1888), an English astronomer, educated at King's College, London, and at Cambridge. After a literary life of some length, during which he contributed a number of articles to magazines, including, especially, the *Popular Science Review*, he became editor of the *Proceedings* of the Royal Astronomical Society. In 1874 he made important researches in the transits of Venus, and after making four lecture tours through America he finally settled in Missouri. Most of his publications are of a popular character and have contributed a great deal to the enlightenment of the general public. Among the best of his books are *Saturn and His System, Half Hours with a Telescope, Other Worlds than Ours, The Romance of Astronomy, Hereditary Traits, The Great Pyramid* and *Nature Studies.*

Prof'it, the gain resulting to the owner of capital from its employment in buying and selling, in manufacturing or in any commercial undertaking. *Net profit* is the difference in favor of a seller between the selling price of commodities and the original cost, after deducting all charges. The *rate of profit* is the proportion which the amount of profit derived from an undertaking bears to the capital employed in it. *Profit and loss* is the gain or loss arising from goods bought or sold or from any other contingency. In bookkeeping both gains and losses are entitled *profit and loss,* but the distinction is made by placing the former on the credit side and the latter on the debit side.

Progres'sion, in mathematics, a regular or proportional advance in increase or decrease of numbers. A continued *arithmetical progression* is one in which the terms increase or decrease by equal amounts. Thus, 2, 4, 6, 8, 10, is an arithmetical progression, the increment being 2. A *geometrical progression* is one in which the terms increase or decrease in a certain constant ratio, as 2, 4, 8, 16, 32, 64, the constant multiplier in this case being 2.

Prohibition, *pro he bish'un,* **Party,** a political party in the United States, which advocates the prohibition of the sale or manufacture of intoxicating liquors. It was organized at Chicago in 1869. Since 1884 it has forced action in nearly every state on the question of license as applied to the liquor traffic. Full prohibition now exists in Maine, Kansas, and North and South Dakota; partial, in New Hampshire; local option in various forms has been adopted in twenty-four states, and the license system is in force in all the rest except South Carolina, where the state manages a public dispensary. See POLITICAL PARTIES IN THE UNITED STATES.

Prometheus, *pro me'thuse,* in Greek mythology, one of the Titans, brother of Atlas and Epimetheus and father of Deucalion. His name means *forethought,* as that of Epimetheus signifies *afterthought.* In his desire to perform some great favor for the race of man, Prometheus stole fire from heaven and brought it to earth, thus rousing the anger of Jupiter, who, to punish him, sent Pandora with all the ills, to afflict human beings, besides having Prometheus himself chained by Vulcan to a rock. Here an eagle came every day and devoured his liver, which during the night grew again. This torture Prometheus endured for centuries, until he was set free by Hercules.

Prom'issory Note, a written promise to pay a certain sum of money, either on demand or at a future fixed or determinable time. If it is payable to the order of a person or to bearer, it is negotiable. The following is the most common form of a negotiable promissory note:

$500. CHICAGO, ILL., March 9, 1907.

Sixty days after date I promise to pay C. D., or order, five hundred dollars, with interest at the rate of six per cent per annum, for value received. A. B.

This note will be negotiable when endorsed by C. D. If it is sold or transferred without his endorsement, the person to whom it is transferred accepts only such rights in it as C. D. possesses. The one who makes the promise is the maker of the note, the one to whom the promise is made is the payee. See NEGOTIABLE INSTRUMENTS.

Prong'horn, a small goat antelope, which once ranged over the whole of the United States west of the Missouri River, but which is now confined to the unsettled parts of the West. It is an alert, lively little animal, about four and a half feet long, and loves the open plains and

PRONGHORN

wooded glades of the mountains. It is excitable and runs with great rapidity when frightened. Though not a true antelope, it is generally called by that name wherever found.

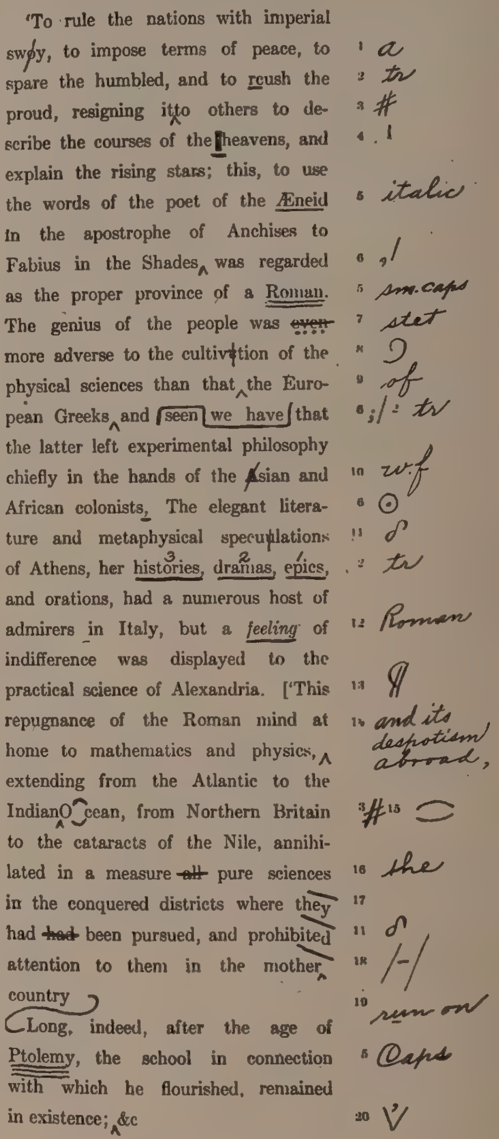
Pro′noun, in grammar, a part of speech that represents an object, but does not definitely name it. It usually stands in place of a noun. The pronouns in commonest use are of the following classes: *personal,* I, thou, you, he, she, it, with their various case and number forms; *conjunctive,* or *relative,* who, which, what and that; *interrogative,* who, which and what; *indefinite,* some, any, much and the like; and *demonstrative,* this, these, that, those.

Proof, in printing, a rough impression from type, taken for correction of errors appearing in composition. A *first proof* is the impression taken with all the errors of workmanship. After this is corrected, another impression is printed with more care, to send to the author; this is termed a *clean proof.* When this is corrected by the author and the type has been altered accordingly, another proof is taken and carefully read over; this is called the *press proof,* or, in case the pages are to be made into electrotypes, the *foundry proof.*

In engraving, a proof is taken from time to time to show the progress of the work. Certain early impressions, usually limited in number, are known by special terms, as, 1, *Artists' proofs,* with no engraved title, sometimes signed in pencil by the painter or engraver, or both; 2, *Remarque proofs,* having some mark, frequently a minute part left white, or a design slightly engraved on the margin; 3, *Lettered proofs,* with title engraved lightly in such a manner as to be easily erased, or in open letters ready for shading, when the title is finally put on the plate for the ordinary impressions.

In the case of coins and medals, proofs are taken, as in engraving, at various stages of the work. The early proofs are usually in cheap metals, but the last proof is taken in the metal of which the coin or medal is to be made. Collectors and museums are always exceedingly anxious to obtain proofs of coins or important medals, and for this reason a number of proofs are sometimes struck. That there may be no question as to the fact of their being proofs, and not finished coins, some detail of the coin is omitted. Thus, the edge, fluted or roughened in the coin, is usually smooth in the proof.

Proof-Reading. The corrections to be made on a proof of printed matter are marked on the margin; and for this purpose various signs or symbols have been universally adopted. The following specimen proof exhibits the application of most of these signs:



'To rule the nations with imperial
swoy, to impose terms of peace, to 1 a
spare the humbled, and to rcush the 2 tr
proud, resigning itto others to de- 3 #
scribe the courses of the heavens, and 4 . I
explain the rising stars; this, to use
the words of the poet of the Æneid 5 italic
in the apostrophe of Anchises to
Fabius in the Shades was regarded 6 ,/
as the proper province of a Roman. 5 sm.caps
The genius of the people was ~~even~~ 7 stet
more adverse to the cultivation of the 8 ꓛ
physical sciences than that the Euro- 9 of
pean Greeks and seen we have that 6 ;/ 2 tr
the latter left experimental philosophy
chiefly in the hands of the Asian and 10 w.f
African colonists, The elegant litera- 6 ⊙
ture and metaphysical speculations 11 δ
of Athens, her histories, dramas, epics, 2 tr
and orations, had a numerous host of
admirers in Italy, but a *feeling* of 12 Roman
indifference was displayed to the
practical science of Alexandria. ['This 13 ¶
repugnance of the Roman mind at 14 and its despotism abroad,
home to mathematics and physics,
extending from the Atlantic to the
Indian Ocean, from Northern Britain 3 # 15 ⁀
to the cataracts of the Nile, annihi-
lated in a measure ~~all~~ pure sciences 16 the
in the conquered districts where they 17
had ~~had~~ been pursued, and prohibited 11 δ
attention to them in the mother 18 /-/
country 19 run on
Long, indeed, after the age of
Ptolemy, the school in connection 5 Caps
with which he flourished, remained
in existence; &c 20 ∨̓

1, A wrong letter. After every mark of correction a line should be drawn, to prevent its being confounded with any other in the same line. 2, A word or letters to be transposed. Where letters are to be transposed they may be stricken out and rewritten in their proper sequence in the margin, like a correction, or they may be underscored, with the marginal "tr," as in the illustration. 3, A *space* wanted. This mark is used when the spacing is insufficient. 4, A space or quadrat *sticking up*. 5, Alteration of type. One line is drawn under the word for *italics*, two for SMALL CAPITALS, three for CAPITALS. 6, Correction or insertion of marks of punctuation. 7, A word struck out, but afterward approved of (Lat. *stet*, "let it stand"). 8, A turned letter. 9, An omission. 10, A letter of a wrong font. 11, A word or letter to be deleted (Lat. *deletus*, p. p. of *delere*, to destroy). 12, Alteration of type. 13, Begin new paragraph. 14, Insertion of a clause. 15, A *space* to be removed or diminished. 16, A wrong word. 17, When letters do not line evenly at the base. 18, Mark for a hyphen. 19, Do not make a new paragraph. 20, The manner in which the apostrophe, inverted commas, the star and other references, and superior letters and figures are marked.

The immediate object of a "reader" or corrector of the proof is to observe and mark every error and oversight of the compositor, with a view to make the printed sheet a perfect copy of the author's manuscript. This is on the supposition that the manuscript itself is quite correct, which is seldom the case; and therefore the duty of a good reader extends to seeing that there are no inconsistencies in orthography, punctuation and abbreviations, and in many cases to the verification of quotations, dates and proper names. When supposed errors are discovered by the reader they should be referred to the author for verification. In case extensive alterations, omissions or additions are likely to be made by writer or editor, it is more convenient to take the proofs on long slips, before division into pages. The making of new paragraphs or the suppression of those in type should be avoided as causing trouble and expense.

The duty of securing consistency in spelling and punctuation is especially important in the case of works on which several writers are employed, such as newspapers and cyclopedias. The corrector has also to direct his attention to the numbering of the pages; to the arrangement of chapters, paragraphs and notes; to observing running titles, etc. It is part of his business to observe the mechanical defects of the work, defective types, turned letters, inequalities of spacing between words, sentences and lines, and to secure symmetry in verses, tables or mathematical operations. In almost all cases two proofs are taken, and in difficult works, such as those in foreign languages, tables, and other special cases, even more are drawn. Lastly follows the revision, in which little more is done than seeing that the compositor has made all the corrections marked on the last proof. It is usual for the writer or author to reserve the correction of the second proof for himself.

The thankless and monotonous business of a corrector or reader is more difficult than the uninitiated would believe. It requires extensive and varied knowledge, accurate acquaintance with the art of typography, and above all, a peculiar sharpness of eye, which, without losing the sense and connection of the whole, takes in at the same time each separate word and letter.

Propor′tion, in mathematics, an equality of ratios, written in a variety of forms, as $\frac{2}{4}=\frac{8}{16}$, $2:4=8:16$ or $2:4::8:16$, but usually read 2 is to 4 as 8 is to 16. The first and last terms of a proportion are called its *extremes*; the second and third terms are called its *means*. The fourth term is said to be a *fourth proportional* to the first three. When the second and third terms are the same, the fourth term is said to be a *third proportional* to the others, and the middle terms are a *mean proportional* to the *extremes*. Numbers are said to be directly or simply proportional when they vary directly as each other; they are said to be inversely proportional when they vary inversely as each other, one increasing as the other decreases. The theory of proportion is sometimes known as the *rule of three*. By the application of algebraic processes to a simple proportion, combinations of the various terms are produced so that new relations between them are shown. For instance, using the proportion $\frac{a}{b}=\frac{c}{d}$, by applying algebraic processes, such proportions as the following are produced:

$$\frac{b}{a}=\frac{d}{c};\ \frac{a+b}{a}=\frac{c+d}{c};\ \frac{a+b}{a-b}=\frac{c+d}{c-d},\ \text{etc.}$$

Propylaea, *pro pe le′a*, a name applied in Greek architecture to a structure outside the entrance gate or door of a sacred enclosure or other precinct. An excellent example is the propylaea at Athens, at the entrance to the Acropolis, begun in 437 B. C. by Mnesicles. It consists of a central ornamental passage with a magnificent Doric portico on each side. The principal gangway of approach is flanked by six tall Ionic columns, whose capitals supply the most beautiful types of the order. The whole is about 75 feet square, and the width across the wings is about 150 feet.

Prose, ordinary spoken or written language, not cast in poetic measure, thus distinguished from verse, or poetry. Artistic and finished prose is among the latest attainments, both of nations and individuals, and it would appear that with most nations classical prose writers are fewer than classical poets. For the various kinds of prose writings, see FABLE; ESSAY; NOVEL.

Proser′pina or **Persephone,** in classical mythology, the daughter of Jupiter and Ceres. One day while gathering flowers in a plain in Sicily, she was surprised by the approach of a gloomy, dark-browed man in a black chariot. He sprang out, seized the maiden and returned with her to his chariot, telling her that he was the god Pluto and that he intended her for his wife. She pled in vain and was finally obliged to accept her station on the throne at the side of Pluto. Her mother, Ceres, at length discovered the whereabouts of her daughter and obtained from Jupiter his promise that she might bring Prosperpina back to earth, provided the girl had eaten nothing while in Hades. When the messenger of Ceres went for Proserpina it was found that she had eaten six pomegranate seeds, and for each of these she was obliged to spend one month each year in Hades, while the other six months were passed on earth. While she was above ground the flowers bloomed and the sun shone and it was summer, while her stay in Hades was regarded as the cause of winter.

Protec′tion, in economics, the governmental policy of conferring artificial advantages upon home producers of certain articles, either by means of bounties or (more commonly) by duties imposed on the same or similar articles introduced from abroad. Such duties may be simply *protective*, that is, of such an amount that the foreign producer can pay the duty and still compete in the market on nearly equal terms; or *prohibitory*, that is, to exclude foreign competition altogether. See TARIFF.

Pro′teids, a name given to substances similar in composition to protein, that is, consisting of carbon, hydrogen, oxygen and nitrogen, sometimes united with sulphur and phosphorus. The gluten of flour, albumin, the fibrin of the blood, the chief constituent of muscle and flesh, and casein are examples of proteids. Proteids are the essential food stuffs.

Pro′teins, foods composed of carbon, hydrogen, nitrogen and oxygen. The same name is given to the nitrogenous material present in the foods, which serve the purpose both of repairing and building up the body and of furnishing heat or energy. Proteins include proteids and nonproteids, the former, or albuminoids, being the most important of the nitrogenous elements of foods.

Pro′tesila′us, in Greek mythology, the king of Phylace, Thessaly, and son of Jason. He married Laodamia, but soon after set off for the Trojan War. He was the first of the Greeks to step on Trojan soil and was, in accordance with an ancient prophecy, the first to be slain. Laodamia, overwhelmed with grief, persuaded the gods to grant the return of Protesilaus to earth for three hours. At the end of that time, rather than be parted from him, Laodamia killed herself, and returned to the lower world with her husband.

Prot′estant Epis′copal Church. See EPISCOPAL CHURCH; ENGLAND, CHURCH OF.

Protestants, a name given to the party who adhered to Luther during the Reformation in 1529 and who protested, or made a solemn declaration of dissent, from a decree of the emperor Charles V and the Diet of Spires. The protesting members were the electors John of Saxony and George of Brandenburg, princes Ernest and Francis of Brunswick-Lüneburg, Philip, landgrave of Hesse, and Wolfgang, prince of Anhalt, together with fourteen imperial cities, the chief of which were Strassburg, Nuremberg, Ulm and Constance. The name is now applied generally to those Christian denominations that differ from the Church of Rome and that sprang from the Reformation.

Pro′teus, in classical mythology, a marine deity who fed the seal-flocks of Neptune in the Aegean Sea. He was represented as a soothsayer, who prophesied only when compelled by force and art, and who tried every means to elude those who consulted him, changing himself, after the manner of the sea gods, into beasts, trees and even fire and water. The name *old man of the sea* was commonly applied to him.

Protoplasm, *pro′to plaz′m*, a substance, transparent and jelly-like in appearance, the real living part of plants and animals. It is the substance of which cells are composed, and it has certain properties which prove that it possesses life. It has the power of spontaneous motion; it is irritable and responds to stimuli of various kinds; it has the power of assimilation; it can take up new material and build it into its own substance; it is capable of reproducing its kind.

Protozo′a, the lowest of the seven branches into which the animal kingdom is usually divided. All are simple, one-celled animals, usually of microscopic size, and they are merely particles of protoplasm, which are able to move about and digest such bits of food as come within their reach. They have no organs, and their motion is really a flowing. From one side of the mass, a projection moves out, and the rest of the mass follows it (See AMOEBA). Some of the infusorians, which are a class of protozoans, have specialized forms (See VORTICELLA). Some are covered with a limy substance, which resembles that in the hard wing of the beetle. The shells of many are exceedingly beautiful in color and marvelously delicate (See FORAMINIFERA). The Protozoans are reproduced by *fission*, that is, when one divides into two, each part becomes a separate animal; or by *budding*, in which a portion of the bud becomes specialized and is eventually cast off as a separate animal, or by *spores* or *germs*, which, being cast off by the parent, live for a time a different existence from the pure protozoan. In this spore form they are able to withstand cold and drouth and are liable to be blown about from one place to another. Consequently, the protozoans are very widely distributed throughout the earth.

Protozoic Era, a division of geologic time extending from the Azoic to the Paleozoic era and including the Algonkian system. It was named from the fact that the earliest specimens of shell protozoa were discovered in its formations. See ALGONKIAN SYSTEM; ARCHAEAN SYSTEM; GEOLOGY; PALEOZOIC ERA.

Proudhon, *proo dohN′*, PIERRE JOSEPH (1809–1865), a French socialist and political writer. At the age of nineteen he entered a printer's office, afterward became a press reader and in this way acquired considerable linguistic knowledge, with the result that he wrote an *Essai de Grammaire Générale.* As a reward for his studious labors, he had conferred on him, by the Academy of Besançon, a pension of 1500 francs for three years. Political economy now became his chief study, and in 1840 his famous work appeared, bearing on the title-page the question, "What is property?" to which the first page of the treatise contains the answer, "It is theft." For this treatise and for two others that followed, he was prosecuted at Besançon, but he was ultimately acquitted. From 1844 to 1847 he managed a system of water transport on the Rhône and Saône. He settled in Paris in 1847, started various newspapers, became a leader in the Revolution of 1848 and was elected a representative for the Seine in the Constituent Assembly. His attempt to found a People's Bank was unsuccessful; and for his outspokenness in the press he was imprisoned for three years.

Provençal, *pro vahNsal′*, **Language and Literature,** strictly the language and literature of that portion of southern France known as Provence, but in its widest application the Provençal language includes the form of speech belonging to the inhabitants of the whole south of France. This language was the earliest cultivated of the Romance languages (or those based on the Latin), and at one time it was extensively used in literature. Provençal, as a new and distinct language, appeared about the tenth century and continued as a medium of literary expression until about the end of the thirteenth century. In the early part of the Middle Ages, indeed, the poets of Provence were the most famous in Europe (See TROUBADOUR). In 1350 a few scholars of Toulouse attempted to revive the decaying glory of the Provençal language, and for this purpose they composed a treatise on grammar and poetry. About the middle of the fifteenth century the language ceased to be used both for administrative and literary purposes, and it has long been reduced almost to the condition of a dialect. In the present century efforts have been made to restore Provençal as a literary language, and poems of no small value have been written in the modern form of it; while a society of literary men and scholars exists for the purpose of furthering its restoration. Still Provençal is a language whose interest as a vehicle of literature is mainly in the past.

Prov′erbs, one of the canonical books of the Old Testament, usually ascribed to Solomon. According to modern Biblical critics the book of *Proverbs* is composed of several sections, written by different authors and at different times, finally collected into a single book at some period subsequent to the return from the captivity.

Prov′idence, R. I., the capital of the state, the second city of New England and the county-seat of Providence co., is situated on Providence River, an arm of Narragansett Bay, 35 mi. from the sea, 40 mi. s. of Boston and 157 mi. n. e. of New York. It is on a number of branches of the New York, New Haven & Hartford railroad. The city is built on both sides of the river and is bounded on the east by the Seekonk River.

The site, covering about 146 square miles, is slightly hilly, the highest elevation attaining an altitude of 200 feet. Because of the peculiarity of its site, the outline of the city is very irregular. The sides and summits of the hills are covered with beautiful dwellings, some of them dating from colonial times, while the business part of the city is on the lower land along the river and bay. The city contains about 230 miles of paved streets, which in the older part of the town are narrow and crooked. It has eight public parks, whose combined area is 540 acres. The most important of these is Williams Park, on the south side. This contains a statue of Roger Williams and has a fine system of boulevards, besides zoölogical gardens and artificial lakes. In front of the city hall is a soldiers' and sailors' monument, and near it is a statue of Gen. Ambrose E. Burnside.

The most important public buildings are the new state capitol, constructed of marble and granite; the Federal building; the courthouse; the city hall; the public library; the English high school; the union railway station, and a number of office buildings, including the Bannigan Building, the Industrial Trust Building, the Equitable Building, Barton Block, Merchants' Bank, National Exchange Bank and the Athenaeum. Among the leading churches are the Roman Catholic Cathedral of Saint Peter and Saint Paul, Grace Episcopal Church, the First Universalist, the Union Congregational, the Central Congregational, the Central Baptist, the Trinity Methodist, All Saints' Memorial and Saint Stephen's Episcopal. Churches of interest because of their historical associations are the First Baptist Church, connected with Brown University and designed by Sir Christopher Wren; Saint John's Church, one of the oldest Episcopal churches in New England, and the Beneficent Congregational Church. The educational institutions include Brown University, occupying an elevated site on the east side (See BROWN UNIVERSITY), the Friends' School and the English High School. The leading charitable and philanthropic institutions are the Butler Hospital for the Insane, the Rhode Island Hospital, Rhode Island Homeopathic Hospital, Saint Joseph's Hospital, the Dexter Asylum for the Poor and the state institution for the deaf. The Rhode Island Historical Society occupies a fine building of brick and granite and has a valuable library. In addition to this are the Providence Public Library of about 90,000 volumes, the Athenaeum Library of 62,000 volumes and the libraries of Brown University and the Young Men's Christian Association.

Providence is one of the most important industrial centers of New England and contains a large number of manufactories. Chief among these are the manufactures of jewelry and allied industries. Closely associated with the jewelry industries is the manufacture of silverware. In both of these industries Providence ranks among the leading cities of the United States. It is also the leading city in the manufacture of files and screws, and other manufactures include worsteds, woolen goods, cotton goods, rubber goods, engines, locomotives, machinery and stoves. Dyeing and bleaching, slaughtering and meat packing and brewing are also of considerable importance. The city has an extensive coastwise and inland trade, but its foreign commerce is not correspondingly great, because the harbor will not admit the largest ocean vessels.

Providence was settled in 1636 by Roger Williams, and is noted as the first settlement in New England in which religious freedom was guaranteed the inhabitants. It was also here that the first Baptist church in America was founded. The settlement grew slowly, and at the end of the first century of its existence it numbered scarcely 4000 inhabitants. After the War of 1812 it became more prosperous and was chartered as a city in 1832. It has suffered several times from fire and flood, but has arisen from each disaster with renewed vigor, and its growth has been parallel with the industrial growth of the country. Population in 1905, 198,635.

Providence Plantations. See RHODE ISLAND.

Pro'vo City, UTAH, the county-seat of Utah co., about 45 mi. s. of Salt Lake City, on the Provo River and on the Oregon Short Line and the Rio Grande Western railroads. The city is in a farming, stock-raising and fruit-growing region, and it has canneries, flour and lumber mills and manufactories of woolen goods, roofing and other articles. Provo Cañon, Utah Lake and Bridal Veil Falls are of considerable scenic interest. The Brigham Young Academy is located here, and the city also has a state asylum for the insane, a Mormon tabernacle and the Proctor Academy. The place was settled in 1849 and the city was incorporated in 1851. Population in 1900, 6185.

Prune, a dried or preserved plum. The best prunes come from Germany and France, where they are very carefully prepared from the choicest plums and packed in fancy boxes. They are eaten without cooking and are thought to be a great delicacy. The common prunes of the market are from southeastern Europe or from California, which now produces large quantities. These prunes require cooking to make them palatable.

Pru'ning, cutting portions of a plant, as stem, branches, shoots or roots, for the purpose of checking growth in one direction and assisting it in another. While the immediate effect is to reduce the growth of the plant, its final effect is to produce a larger and stronger plant. Plants are pruned for various purposes. The gardener prunes to change the form of his plant or to increase the size and brilliancy of the flowers. The nurseryman prunes to aid the plant in perfecting its fruit. Pruning should be done when the plant is in full vigor, as the wounds then heal quickly. Branches should be cut close to the part from which they are taken, and if they are large, the wound should be covered with paint or wax, to protect it from the weather.

Prussia, *prush'a,* a kingdom of Europe, the largest state of the German Empire. For geographical features, see GERMANY.

HISTORY. The historical development of the Prussian kingdom is closely associated with two important elements. The first of these is found in the growth in power of the electorate of Brandenburg, which formed the nucleus of the future kingdom of Prussia. The second is associated with the rule of the Hohenzollern family, under whose skilful diplomatic and military guidance the small electorate of Brandenburg grew into an important kingdom (See BRANDENBURG).

The Prussians were a Slavonic people, inhabiting the coast territory between the Vistula and the Niemen. Their neighbors, the Poles, endeavored to convert them to Christianity, and to this end conquered the whole country, with the aid of the Teutonic Knights (1283). As the price of their assistance, the knights claimed the conquered territory, and established themselves in castles and walled cities. Their rule was finally overturned by the combined forces of the Prussians and the Poles, and in 1466 West Prussia was ceded to Poland and East Prussia was held by the Teutonic Knights as a fief of Poland. A member of the Hohenzollern family came to power in East Prussia in 1511, and he succeeded in having the state declared a duchy, with himself as hereditary ruler. When the line of his descendants failed, in 1618, the duchy of Prussia was added to Brandenburg, which was ruled by a member of another branch of the Hohenzollern family, John Sigismund.

John Sigismund was succeeded in 1619 by his son, George William, who proved unequal to the crisis of affairs in Germany, brought about by the Thirty Years' War. The electorate suffered severely in this struggle, and when Frederick William I, called the Great Elector, came to the throne in 1640, he found his territory occupied by a Swedish force. Frederick William may be regarded as the virtual founder of the Prussian monarchy. He made Brandenburg a military state and won for it recognition from the powers of Europe (See FREDERICK WILLIAM). The Great Elector, on his death in 1688, was succeeded by his son Frederick, who in 1701 was crowned first king of Prussia. He was succeeded by his son, Frederick William I, whose reign, which lasted until 1740, was on the whole peaceful. A war with Sweden, however, won for the new kingdom a great part of Swedish Pomerania.

Frederick II, called the Great, came to the throne on the death of his father in 1740 (See FREDERICK II, of Prussia). In less than a year after his accession he proclaimed war against Maria Theresa, in order to enforce his claim to Silesia. With varying fortunes the struggle continued until the Peace of Hubertsburg, 1763, which closed the Seven Years' War (See SUCCESSION WARS, subhead *War of the Austrian Succession*; SEVEN YEARS' WAR). The outcome of this war transformed Prussia into one of the first-rate European powers, and the first partition of Poland, which took place in 1772, greatly enlarged the country by the addition of West Prussia.

The successor of Frederick II, his nephew, Frederick William II (1786–1797), interfered in the affairs of France on behalf of Louis XVI, and in consequence he was forced to give up the territory which Prussia had possessed west of the Rhine. A second and a third partition of Poland brought to Prussia considerable accession of territory. Frederick William III, who succeeded to the throne in 1797, attempted at first to remain neutral in the general European struggle against Napoleon. This attitude, however, ultimately led to distrust among the German states, and the formation by the other states of the Confederation of the Rhine left Prussia at the mercy of Napoleon. When in 1806 Frederick William found himself driven into the struggle against France, the result was complete defeat at Jena and Auerstädt. By the Peace of Tilsit (1807), the country was deprived of all lands between the Rhine and the Elbe.

The years which followed were marked in Prussia by sweeping internal reforms, which the crisis necessitated and which were efficiently carried out under Stein, Hardenberg and Scharnhorst. Owing to these reforms, which amounted almost to a revolution, Prussia was able, after Napoleon's disastrous Russian campaign of 1812, to take an important part in the final struggle for his overthrow. At the Congress of Vienna in 1815 Prussia was deprived of some of her possessions, but was recompensed with others which were of more value to her. She also formed one of the states of the German Confederation.

After the restoration of peace, Frederick William III was guided by the councils of Metternich and the Holy Alliance, and he entered upon a reactionary policy, which continued until his death in 1840. Frederick William IV, who succeeded him, tried in 1847 to anticipate the revolutionary movement, which he saw to be imminent, by summoning a general legislative assembly. No real power, however, was conferred on this parliament, and in the following year the king was forced to dismiss his ministers and grant a constitution. In 1849 the imperial crown was offered to Frederick William, but he refused it, and thus he lost the opportunity of placing himself at the head of a united Germany. For the further history of Prussia and the union of the German states under her leadership, see GERMANY, subhead *History*.

Prus'sic Acid or **Hydrocyanic Acid,** an acid discovered by Scheele in 1782, but first prepared in the pure state by Gay-Lussac in 1811. It is a colorless liquid which solidifies at 5° F. to feathery crystals, and which boils at 80°. It dissolves in all proportions in water, forming a liquid which reddens litmus paper but slightly. It is found in the kernels of bitter almonds, peaches, apricots, plums, cherries and quinces; in the blossoms of peaches and aloes; in the leaves of beech, cherry and laurel, and in various parts of other plants. Pure prussic acid is prepared by passing a stream of dry sulphureted hydrogen over dry cyanide of mercury. This acid, which is one of the strongest poisons known, is used medicinally to remove various forms of irritation; but in all cases it must be used with extreme caution. When an overdose is administered, death is instantaneous, and with a lesser dose the symptoms are convulsions or paralysis. The nature of its action is not clearly understood, but the best antidotes are found to be ammonia, chlorine water or a subcutaneous injection of atropine.

Pruth, *proot,* a river of Europe which rises in the Carpathian Mountains, flows east and then southeast, forming part of the boundary between Rumania and Russia, and joins the Danube about 75 miles from the Black Sea. Its length is about 500 miles.

Psalms, *sahmz,* BOOK OF, one of the books of the Old Testament, containing the collection of hymns used by the Jews in the temple service. Each psalm, with a few exceptions, has a particular superscription, such as *Maschil,* instruction, or *Michtam,* memorial. The chronology of the psalms is much disputed. The earliest is said to have been written by Moses, many are attributed to David, a few are supposed to have been written on the return from the captivity, and some in the time of the Maccabees.

Psyche, *si'ke,* in classical mythology, the wife of Cupid. She was so beautiful that she was worshiped by mortals as Venus, and that goddess, becoming jealous, instructed her son Cupid to kill the maiden or to cause her to fall in love with some ugly wretch. Cupid, however, on seeing her promptly fell in love with her himself. He visited her only after dark and instructed her that if she ever made any attempt to find out who he was or to see him in the light, he should be obliged to leave her forever. One night Psyche, spurred on by her jealous sisters, lighted a lamp and held it over Cupid while he slept. In her surprise and joy at her husband's appearance, she gave a start, so that a drop of burning oil fell from her lamp upon Cupid's shoulder and wakened him. He immediately disappeared, and Psyche was forlorn. She entered, shortly after, the service of Venus, hoping thus to win her good will, and was obliged to perform many very difficult tasks. At length, however, Cupid again encountered her and was so enraptured with her beauty that he took her with him to Olympus and petitioned Jupiter to make her immortal. Even Venus was reconciled to the beautiful girl and allowed her son to keep her as his wife. As Cupid was the personification of the heart, so Psyche represented to the ancient Greeks the soul.

Psychology, *si kol'o jy,* the science of mind. There are nearly as many definitions of psychology as there have been writers upon the subject, but in the final analysis, all of these reduce to the definition here given. Psychology treats of the activities and powers of the mind. It is concerned with psychical facts, mental phenomena, or whatever they may be called. The problem, What is mind? belongs to the realm of philosophy. Psychology considers not only mental phenomena, as such, but also their conditions; the order of their development, and the circumstances by which that development is influenced. In the consideration of these conditions, one of the first and most important facts with which the student of psychology comes in contact is the intimate relation of mind and body. The recognition of this fact and its importance have led to the study of psychology from the physiological point of view by nearly all psychologists of modern times. While the relation between the activities of the mind and physiological processes is very close, it must be remembered that physiological processes cannot be changed into mental activities, and that however closely related mind and body may be, an impassable barrier is fixed between them.

ACTIVITIES OF THE MIND. *Consciousness.* The state of mind in which it is aware of its own acts is called consciousness; that is, consciousness may be considered as the mental state which distinguishes a person awake from one asleep. Consciousness makes us aware of every act of knowledge. One not only knows that a thing is thus and so, but he *knows* that he knows it. *Self-consciousness* is the state of mind in which the attention centers upon one's mental activities. It may be voluntary, as when one purposely studies his mental activities to discover the order in which they follow each other, the influence of one upon another or the influence of external conditions upon them all; or it may be involuntary, as when a child or an adult, in performing some act to which he is not accustomed, becomes painfully aware of his actions. This sort of self-consciousness usually leads to embarrassment. One is always in a state of consciousness while awake, but he is not necessarily self-conscious. Under ordinary conditions of consciousness, the attention is centered on the result of the mental activity, not on the processes by which that result is obtained. In writing a letter, playing upon a musical instrument or performing any other act to which one is accustomed, he is aware only of the results produced.

Phases of Mental Activity. Activities of the mind are characterized by three phases, knowing, feeling and willing. Psychologists are divided in opinion as to which phase, knowing or feeling, is first in consciousness; hence, we find some authorities stating that feeling is dependent upon knowing, and others asserting that knowing depends upon feeling. Knowing is the result of attention, and attention is an act of will; but in order that the attention may be fixed upon any object, that object, whether of sense or of thought, must have some value for the mind; that is, the mind must entertain a desire to know something about the object, and this desire causes the will to direct the activities of the mind or center the attention upon it. The desire is feeling, but it is of little importance to know whether knowing or feeling takes precedence. While, for the purpose of treatment, these three phases of activity must be considered separately, it should be remembered that the mind is a unit which cannot be analyzed into parts, and that all phases of self-activity are present in every mental state.

Knowing. Every activity of the mind may be considered as giving us knowledge, since it has reference to some object of sense or of thought, as a house already in existence, a mathematical theory to be developed, or the illness of a friend. The ideas arising from our mental activities become a part of the content of the mind and modify our mental life to a greater or less extent, according to their nature and importance. Ideas are acquired through two sources, the special senses and the reaction of the mental activities upon each other. The senses give us ideas of the external world, and the working of the mental powers gives us those ideas produced by thought, such as scientific treatises, resolutions affecting our lives and theories of government. However, the mind is awakened to activity by its reaction upon the impressions brought through the senses (See SENSATION).

The effect produced through the action of an organ of sense upon the brain is a *sensation.* When we are conscious of the sensation, the mind reacts upon it and the result is an idea. An orange is placed in view of a child; the image of the orange is formed upon the retina of the eye, where it excites the sensitive organs of the optic nerve; the excitation conveys the impression to the optical centers, which react upon it, and the child gets an idea of the size, form and color of the orange. The idea is complex and separable into three ideas, of form, of color and of size. If the child places his hand upon the point of a tack or a pin, the proper brain centers are excited through a different set of nerves, and he gets the idea of pain. Again, he may listen to a song or story by which he is moved to laughter or pity or led to construct beautiful pictures of the people and scenes described. In each instance the ideas obtained are added to those already in the mind. For a fuller description of the processes by which ideas are obtained, see, in the order named, SENSATION; PERCEPTION; APPERCEPTION; CONCEPT.

Feeling. Every idea appeals to the individual with more or less force, that is, it has its own particular value. To the extent of its value it arouses the feelings or, as we usually express it, awakens within us an interest. Some ideas are much stronger than others. In the case of the child, the pain caused by the injury from the tack will arouse his feelings to a higher degree of activity than the impressions made by the orange or the story. The feeling is given definiteness through the idea with which it is associated, so that whether or not feelings constitute the first phase of mental activity, through *knowing* they are given definite form and value, and the feeling is always associated with the idea (See FEELING).

Willing. Willing is related to both knowing and feeling. Attention is the first essential to knowing, and we have already stated that attention is an act of the will. Furthermore, willing may be considered as the action or the motor element accompanying the idea. The knowledge of the orange may arouse the child to a desire to obtain it, and this will lead to whatever action is necessary to secure the fruit. This action includes: (a) decision, a mental act; (b) execution, or carrying the decision into effect. See INTEREST; WILL.

The three phases of activity are not present in every idea in equal proportion, and for this reason they are considered by some authorities to be antagonistic; but the antagonism consists merely in one phase becoming so prominent as to overshadow the others. Intense feeling or intense action suppresses the knowing phase of activity and is seldom accompanied by clear ideas; on the other hand, when the knowing phase is most active, it is accompanied by a moderate degree of feeling, and the willing is confined to concentrating the mental powers upon the object under consideration.

DEVELOPMENT OF MENTAL POWERS. The development of the mental powers keeps pace with the growth of the physical organism. This development is along the following lines: (1) Operations which were at first difficult and slow become increasingly easy and more rapid from repetition (See HABIT). (2) New operations of an equal degree of difficulty grow easier; the powers of observation become keener and more comprehensive; the memory retains more readily and recalls past impressions with a greater degree of ease; thought becomes more mature, and the judgment more accurate. (3) Ability is acquired to execute more complex and difficult operations. The man is capable of making nicer distinctions and broader classifications than the child; he also possesses a power of analysis which enables him to solve intricate problems, discover new laws and formulate theories. Our systems of jurisprudence, government, sociology, theology and many institutions which affect society are the result of the exercise of these powers by the ablest minds.

The mental powers do not all develop equally at the same time. The early period of life is spent in gaining knowledge of the external world, and those powers by which the mind becomes acquainted with its environment are at this time the most active. These are the powers of sensation, perception and memory. During the first ten or twelve years of the child's life the senses are keen, and they should be trained, not only to observe broadly, but also to make nice distinctions. During this period the memory is especially active.

The ideas acquired react upon the mind, and the child is continually comparing and classifying, at first roughly, and then with greater discrimination. As the mental powers mature, the thinking power becomes active, along with the memory, and this brings into play the constructive power of the imagination, by means of which the child builds many curious things from the material at his disposal and constructs wonderful castles in the air. See CONCEPT; IMAGINATION.

The feelings and the will develop along with the so-called intellectual powers. At first the feelings are not under control; the child abandons himself to his joys and sorrows without restraint. Gradually the will begins to assert itself, and the emotions become less violent. They are also directed so that they assist the perception, memory and other intellectual powers. The child is intensely interested in his surroundings, and for this reason the ideas gained during his early years remain with him through life. The development of feelings, like that of the intellectual powers, is along the lines of finer discrimination and broader application. As one's knowledge is extended, one's sympathies are broadened and one's likes and dislikes are modified.

The will gains in strength and pliability and extends its control over all other mental powers. Its activities are complex, and it seldom reaches its highest culture before adult life and in many cases not until later (See WILL).

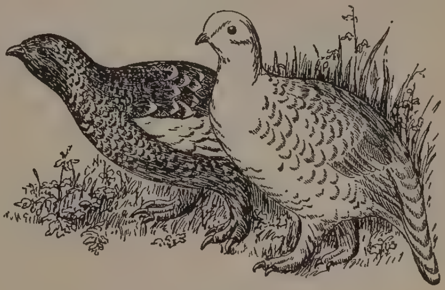
The development of the brain continues until the twentieth year; after that age it is generally considered that this organ is less pliable, and it is more difficult to obtain entirely new ideas. As one grows older, one's views and habits of life become still more definitely fixed, and whatever knowledge one gains is modified by that already in the mind. From this it follows that early training is of the greatest importance. While the mental powers are active through life, we rely upon some at one period and upon others at another. The child relies more upon his powers of observation; the man, more upon reason and judgment. The child reproduces past events by memory; the man often arrives at the same result by a course of reasoning. The more complex activities, such as reason and judgment, depend upon the simpler activities, observation and memory. Therefore, unless these simpler activities are brought to a high degree of perfection at the proper period in life, reason and judgment can never reach their fullest development.

In addition to the articles already named, see MEMORY; REASON; EDUCATION; EDUCATION, HISTORY OF; PEDAGOGICS; METHODS OF TEACHING. Consult Halleck's *Psychology and Psychic Culture* and *Education of the Central Nervous System*, Tracy's *Psychology of Childhood*, Sully's *Outlines of Psychology*, James's *Psychology* (briefer course), Dewey's *Psychology* and Baldwin's *Mental Development*.

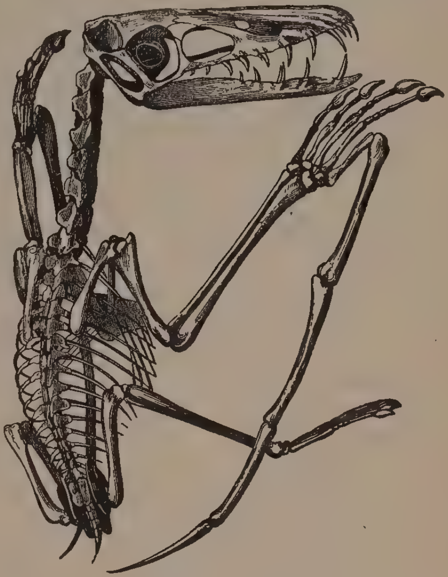
Ptarmigan, *tahr'mi gan,* a bird of the grouse family, distinguished from the true grouse by its feathered toes. In winter the plumage of most species becomes white, and even in summer much of it remains so. The ptarmigans live in the northern regions of both hemispheres and find their living among the lichens, mosses and stunted plants that grow on the rocks and in the snow. Several species are known, all of which run rapidly and fly without making the whirring noise of the true grouse.

Pteridophytes, *ter'id o fites,* the highest of the four orders into which the non-flowering plants are divided. Included among these are the ferns, scouring rushes and club mosses. In many respects they resemble flowering plants. They have real roots, and although they do not possess a stem, the rootstock frequently resembles one and rises to a height of many feet.

Pterodactyl, *ter o dak'til,* (winged finger), a genus of extinct flying reptiles, found in the Jura Limestone formations, in some sections of Europe. The pterodactyls had a moderately long neck and a large head. The jaws were armed with equal and pointed teeth; most of the bones, like those of birds, were hollow and filled with air; but the chief characteristic consisted in the excessive elongation of the little finger of the fore foot, which served to support a flying membrane, forming a wing somewhat resembling the wing of a bat. A number of species have been discovered, most of them small or of moderate size, but one must have had an expanse of wing of at least twenty feet.



PTARMIGANS
Summer and winter plumage



SKELETON OF PTERODACTYL

Ptolemy, *tol'e my,* the name of a line of kings, who succeeded, on the division of the empire of Alexander the Great, to the portion of his dominions of which Egypt was the head. PTOLEMY I (called *Soter*, the Savior) was by birth a Macedonian. On the death of Alexander he secured for himself the government of Egypt and made Alexandria a center of Greek culture. He was a great patron of art, learning and literature and founded the celebrated Alexandrian library. The lighthouse on the island of Pharos was also built during his rule. PTOLEMY II succeeded his father and reigned in almost complete peace. His chief care as ruler was directed to the internal administration of his kingdom. PTOLEMY III (surnamed *Euergetes*, the benefactor) brought Egypt to a very high point of prosperity. He was not only a conqueror, but also, like his predecessors, a patron of learning. PTOLEMY V was less than five years old at his father's death, and this led Philip of Macedon and Antiochus III of Syria to combine to dispossess Ptolemy and divide his dominions. To avert this danger the guardians of the young king placed him under the protection of Rome, which thus had first an occasion for interfering in the affairs of Egypt. During the reigns of the succeeding Ptolemies the influence of the Romans in Egypt gradually increased, with a corresponding decrease in the independence of the native sovereigns. PTOLEMY XIV reigned jointly with his sister Cleopatra till 48 B. C., when Cleopatra was expelled, raised an army in Syria and invaded Egypt. On the arrival of Caesar, Cleopatra by her charms acquired an ascendency over him. Ptolemy put himself at the head of the insurgents, was defeated by Caesar and was drowned in attempting to make his escape. PTOLEMY XV was then declared king by Caesar, in conjunction with his sister Cleopatra.

Ptolemy, a famous author who lived at Alexandria in the second century after Christ. Little is known of his life, but he left a work on astronomy and another on geography. The latter was the standard for geography until the discoveries of the fifteenth and sixteenth centuries. The former contained all that was known of astronomy at that time and formed the basis of all astronomy until the beginning of the sixteenth century. During the Middle Ages the book was lost, but was found in an Arabic translation. According to the Ptolemaic system, the earth is a globe and the center of everything. Around it revolves the hollow sphere of the heavens, so large that in comparison with it the earth is but as the point of a pin. The moon and the sun revolve around the earth, but in circles of which the earth is not the center. There were seven planets, arranged according to distance from the earth in this order: the Moon, Mercury, Venus, the Sun, Mars, Jupiter, Saturn. See COPERNICUS; PLANET.

Ptomaine, *to'mayn,* the name given to poisonous substances that are formed by the decay of animal matter after death. See PUTREFACTION.

Public Health Acts. See HEALTH, BOARDS OF.

Public Lands. See LANDS, PUBLIC.

Public Schools. See COMMON SCHOOLS.

Puck, the name given to an elf or fairy that plays an important part in English folklore. He is noted especially for his mischievous conduct, but he also has the power to bestow small favors upon those who propitiate him by kindness and presents. The name has come to be a general term to describe all fairies. Puck was introduced by Shakespeare in his *Midsummer Night's Dream.* He is sometimes identified with Robin Goodfellow.

Pudding, *pood'ing,* **Stone.** See CONGLOMERATE.

Puebla, *pwa'bla,* or **Puebla de Zaragoza** (formerly La Puebla de los Angeles), a city of Mexico, capital of the State of Puebla, on a plateau 63 mi. e. s. e. of the City of Mexico. It has wide streets, spacious squares and well-built houses. The cathedral is magnificent, and there are a number of other beautiful churches. There are also several colleges, a museum and a theater. Puebla is one of the chief seats of Mexican manufacturing industry, and its principal products are cotton and woolen goods, glass, leather, earthenware, straw hats and paper. The city was built by the Spaniards about 1530. During the Mexican War the United States troops held the town for some time. Population in 1900, 93,521.

Pueblo, *pweb'lo,* a name given originally to the villages of certain indian tribes that lived in the dry regions of Arizona, New Mexico and Mexico. Now the name is applied to the indians themselves. At the time of the Spanish discovery there were probably 30,000 of these indians, though for many years, with little change, the number has been about 10,000. The ruins still to be seen in various parts of the southwest show that these indians at different times wandered about, abandoning one location and settling in another, for reasons of which we know nothing. Their houses are clustered tightly together, one frequently overlapping and rising above another. Narrow and crooked alleys separate the buildings into irregular blocks. There are no openings in the walls of the lower stories, except the narrowest of window slits, but the upper stories had both doors and windows. The indians entered through the roof, to which they gained access by movable ladders, which were drawn up at night. The whole village worked together on enterprises of general interest, such as the construction of irrigating ditches, but each family lived in many respects an independent life. They subsisted principally by agriculture and had carried the art of weaving farther than any other indians, while their pottery was among the very best. Most of the work was done by the women, as was customary in other tribes. The men were gayly clothed with robes and jackets, elaborately decorated with tassels and fringes. Their stockings and sandals were woven, and in times of war the men carried firmly woven shields and wore armor made from fibrous plants and thickly padded with cotton (See INDIANS, AMERICAN, *color plate*, Figs. 6 and 7). The Pueblo do not all speak the same language, and of the numerous tribes the Zuni is the most important. See ZUNI; MOKI.

Pueblo, COLO., the county-seat of Pueblo co., 122 mi. s. by e. of Denver, on the Arkansas River, at the mouth of Fountain Creek, and on the Atchison, Topeka & Santa Fé, the Chicago, Rock Island & Pacific, the Missouri Pacific, the Colorado & Southern and the Denver & Rio Grande railroads. The city is near the eastern foothills of the Rocky Mountains, has an elevation of over 4600 feet, lies on both sides of the Arkansas River and is in the immediate vicinity of extensive deposits of coal, oil and limestone. Although located in a rapidly developing agricultural region, it owes its prosperity mainly to its manufacturing and smelting interests. Its smelters treat gold, silver, copper, lead and zinc ores, while its immense steel plant, railroad shops, foundries, machine shops and other factories make it the principal manufacturing city of the Rocky Mountain region. The state asylum for the insane is located here, as is also the large hospital of the Colorado Fuel and Iron Company and several hospitals and sanitariums of lesser note. Other important institutions are the Loretto Academy, the McClellan Library (in a fine Carnegie building) and the law library. Of Pueblo's numerous parks, the most important are Mineral Palace Park, which takes its name from the Mineral Palace, originally designed as a museum of mineralogy, and City Park, noted for the great variety of trees it contains. There is a separate system of public schools for each side of the river, each maintaining a well-equipped high school. The business streets are well paved; the city owns its waterworks and is supplied by private corporations with electric lights, trolley cars and both illuminating and fuel gas.

The Mormons located here temporarily in 1846 and a trading post was established in 1850, but the traders were massacred by the indians in 1854. The city was laid out in 1859 and secured its charter in 1873. Population in 1900, 28,157, but growth since has been considerable.

Puerto Principe, *pwair'to preen'the pay,* a town of Cuba, capital of the Province of Puerto Principe, situated about 300 mi. s. e. of Havana, with which it is connected by rail. It is antiquated in appearance, has narrow, crooked streets and old houses. The region about the city is a cattle-raising country, and the chief industries of the city are connected with cattle raising. Cigars are also manufactured. Under the Spaniards, Puerto Principe was a military post of importance and was well fortified. The territory immediately surrounding the city was one of the centers of insurgent operations during the revolution. Population, 25,102.

PUFFIN

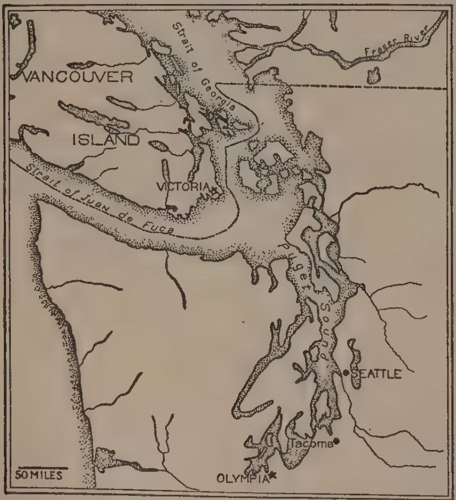
Puff Adder. See ADDER.

Puff'ball, a ball-like fungus, which grows close to the ground. When mature it is filled with minute brown spores, which are puffed out in smoke-like clouds from an opening at the top, if the ball is pressed. See MUSHROOMS.

Puf'fin, a marine diving bird, that lives in the Antarctic and north temperate region on both sides of the Atlantic. It is one of the auks and is remarkable for its large, compressed bill, that in the breeding season is red, with blue and yellow markings. Curious projections appear at the same time around the bill and near the eye. The bird has a white breast, a gray face and black back and collar. Puffins breed in colonies upon rocks and in holes in the ground near the sea, each female laying one white egg. (See illustration on preceding page.)

Pug, a small dog, distinguished by a stout body and a short nose, which is usually wrinkled. The hair is short and smooth, usually of a fawn color, and the nose is black. The pug is supposed to have been introduced into England from Holland and has been a household pet for several centuries.

Puget, *pu'jet,* **Sound,** a branch of the Pacific Ocean which indents the northwestern coast of the United States. It is an inland extension of the straits of Georgia and Juan de Fuca, which separate the island of Vancouver from the mainland. The sound extends southward for about 100 miles and is divided into two branches, known as Hood's Canal, the western branch, and Admiralty Inlet, the eastern branch. The depth of water is from 180 to over 925 feet. There are no obstructions to the entrance of the sound, and it forms one of the largest inland harbors in the world. On its shores are Seattle, Tacoma and Port Townsend, each of which has extensive ocean traffic. See SEATTLE; TACOMA; WASHINGTON (State).



Pulaski, *poo lahs'ke,* CASIMIR (Polish, PULAWSKI, KASIMIERZ) (1748–1779), a Polish soldier, born in Podolia, Poland, the son of a nobleman. He fought gallantly in Poland's war for freedom against Russia and was exiled for alleged connection with a plot to abduct King Stanislas in 1771. His estates being confiscated, he began an adventurous career in Turkey and France and finally went to America, where he arrived in 1777. He offered his services in the Revolutionary cause, fought at the Battle of the Brandywine as chief of dragoons and was made brigadier general in the Continental Army. At the head of an independent force of cavalry and light infantry, known as Pulaski's Legion, he served in the southern campaign, but was mortally wounded in a furious assault upon the city of Savannah, October 9, 1779.

Pu'litzer, JOSEPH (1847–   ), an American journalist, born in Budapest, Hungary. In 1864 he came to America, served for a time in the Union armies and began his journalistic career on the *Westliche Post,* in Saint Louis, under Carl Schurz. He later became editor and proprietor of the paper. He was elected to the Missouri legislature in 1869 and was a delegate to the Liberal Republican convention in 1872. Thereafter he became a Democrat, and in 1884 he was elected a member of Congress, but served only a few months. He founded the Saint Louis *Post-Dispatch* (combining the *Post* and *Dispatch*) in 1878, and he purchased the New York *World* in 1883. In 1903 he endowed a school of journalism at Columbia University.

Pul'ley, a small wheel, turning upon an axis. The rim may be flat or grooved, according to the use to which the pulley is to be put. The frame in which the pulley is suspended is known as the block. Pulleys are of two classes, fixed and movable. The *fixed* pulley is one which does not change its position and is used simply for the purpose of changing the direction of the force applied. A *movable* pulley is one fixed in a movable block, which rises and falls with a weight. The law of equilibrium is that the weight is equal to the power, multiplied by twice the number of movable pulleys. In the single pulley, shown in Fig. 1, there is no advantage. The lever arms r and R being equal, the point B is the same distance from C, the point of support, as the point *A*. Therefore, the power *P* must equal the weight *W*, when they are in equilibrium. In the movable pulley, Fig. 2, the weight *W*, is suspended by two cords, each of which sustains one-half of it; hence, if the power, *P*, is one-half the weight, the pulley is in equilibrium. Pulleys are used in derricks and tackle blocks. In machinery the term *pulley* is applied to a wheel with a broad, nearly flat, face, used for carrying a belt which imparts motion to machinery.

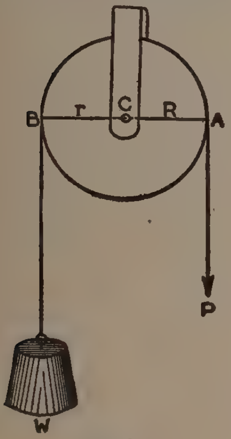


FIG. 1

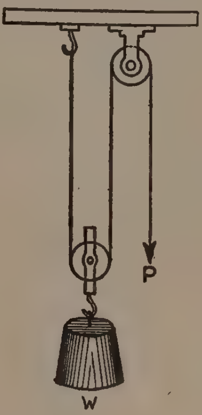


FIG. 2

Pull'man, George Mortimer (1831–1897), an American capitalist, born in Chautauqua County, N. Y. At twenty-two he contracted for removing warehouses on the Erie canal. Six years later, in Chicago, he became a building contractor and raised entire blocks of brick and stone buildings. In 1859 he made his first sleeping car, now developed into the car known all over the world—especially adapted for sleeping apartments or as a drawing room or dining car. The industrial town of Pullman was founded by him. See Railroad, subhead *Equipment*.

Pulque, *pull'ka,* or **Octli,** a favorite drink in Mexico and Central America, made from the juice of various species of agave, pleasant and harmless until after protracted fermentation, when it becomes intoxicating.

Pulse, The, the wave movement of the blood through the arterial system. The movement begins in the heart, with the contraction of the ventricle which sends a volume of blood into the aorta, which is already full. The expansions of the walls of the aorta and their contraction as the blood moves on makes the intermittent flow, which is easily felt in the radial artery of the wrist, in the temporal artery of the temples and in the carotids of the neck. Any cause which affects the action of the heart affects also the pulse. In healthy adults the number of beats per minute varies from sixty-five to seventy-five, the most common rate being seventy-two. The pulse is quicker in children than in adults and slower in old age than in middle life. There is no pulse in the capillaries and veins. See Sphygmograph.

Pulse Family. See Leguminosae.

Pultowa, *pul to'va.* See Charles XII, of Sweden.

Pu'ma, one of the largest of cats, wild in the western hemisphere. The adult is about six feet long and weighs two hundred pounds, though there are variations in size. It is usually reddish-brown above, white on the throat, breast and insides of legs, black on the tip of the tail and muzzle and with a black stripe along the back. It is widely distributed over the western continent and has been given the name of *cougar*, *panther*, *American lion* and *catamount*. It lives in trees and was formerly much dreaded for its supposed habit of springing upon travelers unawares, from the branches of the trees. The food consists of large and small mammals, as deer and cattle.

Pumice, *pum'is,* a volcanic rock of various colors, gray, white, reddish brown or black, composed chiefly of glass. It is hard, rough and porous; it is lighter than water and resembles the slag produced in an iron furnace. Pumice is really a loose, spongy, froth-like lava. It is used for polishing ivory, wood, marble, metals and glass; also, for smoothing the surfaces of skins and parchment.

Pump, a device for raising liquids or removing gas from a closed vessel. The necessary parts of a pump are the barrel, the piston, the piston rod, the valves and the suction pipe. There are numerous patterns of pumps, but these can all be grouped under the following classes: suction pumps, including lift pumps and force pumps, and centrifugal pumps.

The Suction Pump. This is the common household pump. It consists of a piston fitted to work air-tight in the barrel, and containing a valve opening upward. It is connected by a piston rod with the handle, by which it is moved up and down. At the bottom of the barrel is another valve, also opening upward and closing the upper end of the suction tube. When the piston moves downward, the air in the barrel is forced up through the valve in the piston. As the piston rises, the pressure of the air closes this valve, and a partial vacuum is produced in the barrel. The water is forced upward in the suction pipe by the pressure of the air upon its surface in the cistern or well. The first few strokes of the pump exhaust the air from the barrel and the suction tube. As the air is exhausted the water continues to rise until it reaches the barrel. It is then pumped out in the same manner that the air was exhausted. Under the most perfect conditions this pump cannot raise water over 28 or 30 feet, and it will seldom work satisfactorily for more than 24 feet.

The *lift* pump also has two valves and a piston above, opening upward, but it differs from the suction pump in being placed in the bottom of the cistern or well from which the water is to be raised, and in its ability to raise water to any desired height, while the efficiency of the suction pump is limited by the pressure of the air.

The *force* pump has no valve in the piston, but it has a valve opening outward at the point where the delivery tube is attached to the barrel. Most force pumps are double-acting—that is, they have two pistons—and the water is forced from the pump into an air chamber, from which the elasticity of the compressed air draws it in a continuous stream.

CENTRIFUGAL PUMPS are employed where the lift is not too great and the quantity of water is considerable. The common form consists of a wheel, shaped like an ordinary fan, with passages leading from its center to its circumference. This is made to rotate very rapidly in the casing. The circumference communicates with the delivery pipe, and the center connects with the pipe leading to the water which is in the pump. The rapid revolution which is in the wheel causes the water to flow from its center to its circumference, and in this way sucks the water up to the center of the wheel, from which it is carried to the circumference and thence out through the tube.

Pump′kin, a climbing plant and its fruit, a native of India, but at present cultivated in America and most parts of Europe. The fruit, which is of a reddish or golden yellow, sometimes acquires a diameter of two feet. The New England pumpkin is a favorite material for pies.

Punch, a tool worked by pressure or percussion and employed for making apertures, in cutting out shapes from sheets or plates of various materials and in impressing dies. Punches are usually made of steel and are variously shaped at one end for different uses. They are solid for stamping dies or for perforating holes in metallic plates and are hollow and sharp-edged for cutting out blanks, as for buttons, steel pens, jewelry and the like.

Punc′tua′tion, the art of employing signs by which any writing or composition is separated, as the sense requires, into sentences and parts of sentences. Its primary object is to promote clearness of expression. There are no punctuation marks in the old Greek and Roman manuscripts; even the words are not separated. This running of all the words together makes them very difficult to read. First of all, authors began to correct this by separating the words, either by spaces or by dots. Next, they learned to place a full stop after sentences. But it was not until the beginning of the sixteenth century that a real system of punctuation had been devised; and our present marks are in a great degree due to the wisdom and invention of Aldus Manutius, a Venetian, who died in 1515. The principal marks of punctuation used at present are the period (.), the colon (:), the semicolon (;), the comma (,), the interrogation point (?), the exclamation mark (!), the dash (—), and the parentheses (()).

Pu′nic Wars, the name given to three great wars waged between Rome and Carthage. The first lasted from 264 to 241 B. C., the second from 218 to 201 B. C., and the third from 149 to 146 B. C. In all three of these struggles the Romans were victorious, and at the close of the last, Carthage was destroyed, thus allowing Rome unquestioned supremacy. See CARTHAGE; HAMILCAR BARCA; HANNIBAL; REGULUS, MARCUS ATTILIUS; SCIPIO.

Punjab, *pun jahb′*, a province occupying the northwestern part of British India, under the administration of a lieutenant governor. The area is 133,741 sq. mi., 36,532 sq. mi. being under the control of native rulers, who, however, are subject to British authorities. The name means "five rivers," and it is taken from the five important streams which flow through the province. For surface, climate and products, see INDIA.

Purdue′ University, a state institution of higher learning, established at Lafayette, Ind., in 1869. The university is really an institute of technology and comprises schools of mechanical, civil and electrical engineering, agricultural science and pharmacy. All students are required to spend an average of three hours a day in laboratory, shop or field. The faculty numbers about 100, and there are about 1300 students.

Pur′gatory, a place of punishment or purgation, where, according to the belief of Roman

Catholics and others, the souls of those dying penitent are purified from pardonable sins. The final salvation of those in purgatory is assured, so it is not a place of probation. Those dying impenitent are not received there. It is believed that the souls in purgatory receive repose and relief from suffering through the prayers of the faithful on earth. The Reformers rejected the doctrine of a purgatory.

Pu'ritans, a name first given about 1564 to those who wished to reform the Church of England. Queen Elizabeth, though upholding the national Church, had retained many of the ceremonies and vestments of the older worship and had thus antagonized a large part of the Protestant party, who wished to have the Anglican Church differ more decidedly from the Catholic Church. At the close of her reign, the Puritans were of three classes—those who desired a changed worship but wished to remain in the Church; those who wished to adopt Calvinism as the Established Church, and those who did not believe in the Established Church, but thought that each congregation should govern itself. These were led first by Robert Brown and were known as Brownists, but later were more generally called Separatists or Independents. The Puritans gained in strength in the reigns of James I and Charles I, in spite of great efforts to overthrow them, and they took the leading part in the Civil War, which resulted in the establishment of the Commonwealth. With the restoration of the Stuarts in 1660, the Act of Uniformity placed the Puritans in the position of dissenters, and many emigrated to America, whither a large number of their comrades had already gone as early as 1620. Plymouth and Massachusetts Bay, New Haven and Connecticut were in reality Puritan commonwealths until early in the eighteenth century, when religious liberty was allowed. The Puritans in America eventually divided into numerous sects, of which the Presbyterians (Calvinists), the Congregationalists (Independents) and the Baptists became the most important.

Pusey, *pu'zy,* EDWARD BOUVERIE (1800–1882), an English minister and writer, after whom the Tractarian movement in the Church of England was called Puseyism. In 1828 he was appointed to the regius professorship of Hebrew at Oxford, to which was attached a canonry of Christ Church. In 1833 the *Tracts for the Times* began to appear, but Pusey was not prominently connected with the movement until 1835–1836. He published a defense of the famous *Tract No. 90,* and in 1843 he was suspended by the vice chancellor of Oxford from preaching for three years, on account of his celebrated sermon on the eucharist. He was not fond of society and had few personal friends, but he was noted for his learning, love of books and purity of life. He wrote several volumes of sermons and commentaries on the minor prophets. A memorial building at Oxford bears his name. See TRACTARIANISM.

Put'nam, CONN., one of the county-seats of Windham co., 45 mi. n. e. of Hartford, on the Quinebaug River and on two lines of the New York, New Haven & Hartford railroad. The city is in an agricultural region and contains iron works, cotton, woolen and silk mills, boot, shoe and other factories. It has the Day-Kimball Hospital, Saint Mary's Convent, Notre Dame Academy and a public library. The picturesque Cargill Falls in the vicinity are of interest. Putnam was settled in 1855 and was chartered as a city in 1895. Population in 1900, 6667.

Putnam, ISRAEL (1718–1790), an American soldier, born at Old Salem Village, Mass. When the French and Indian War broke out he joined the army and rendered good service throughout the war. He was taken prisoner by the French and fell into the hands of the indians, who tortured him cruelly. In the disturbances which led up to the Revolutionary War, Putnam showed himself a most determined opponent of British aggressions, and when the war broke out he joined the army. He was present at Bunker Hill and later destroyed much British shipping on the expedition to Noddle's Island. In 1775 he was in command of the army at Long Island, and in the following year he took part with Washington in the New Jersey campaign, fighting in the Battle of Princeton. His evacuation of two forts in 1777 led to his removal from command, but he was acquitted by the commission appointed to examine him and was given his former rank. Putnam was a man of the greatest bravery, but he had little ability as a military commander.

Putnam, RUFUS (1738–1824), an American soldier and frontiersman, born at Sutton, Mass. He fought in the last French and Indian war, served in the American army during the Revolution, part of the time as an engineer and part in active military service, and at the close of the war he was made a brigadier general in the American army. In 1786 he organized, with Benjamin Tucker, Manasseh Cutler and others, a company of revolutionary veterans for the purpose of settling the district of Ohio, and he was one of the three directors of the Ohio Company. Partly through his influence, Congress passed the Ordinance of 1787, establishing a civil government in the territory. In the same year it sold to the Ohio Company a million and a half acres at the junction of the Muskingum and Ohio rivers. There, in the following year, Putnam established the town of Marietta. In 1796 he became surveyor-general of the United States. With the exception of Marquis de Lafayette, he was the last surviving general officer of the Revolutionary army.

Pu′trefac′tion, the decomposition of dead organic matter, which is usually accompanied by the rise of ill-smelling gases. It is now known to be due to the agency of bacteria or other organisms, which find their way to the dead matter and multiply rapidly therein. The substances in which these bacteria are thus developed separate into their original elements or are reduced to much more simple compounds. The decay of animal substances is usually accompanied by more poisonous and fetid exhalations than come from the decay of vegetable products. Ammonia or ammoniacal compounds and other combinations of hydrogen, together with other highly infectious vapors and gases, are formed in most cases of animal putrefaction. Chlorine will usually render these harmless. The rapidity of putrefaction and the nature of its products are to a great extent dependent upon temperature, moisture and the access of air. Substances decay most rapidly in a temperature of between sixty and eighty degrees, where there is considerable humidity and a free access of air. Putrefaction, then, may be checked or altogether prevented by a very high or a very low temperature, by excluding the air and by keeping the body dry. Certain antiseptics prevent, and to some extent arrest, the progress of putrefaction. See BACTERIA AND BACTERIOLOGY; FERMENTATION.

Pye, HENRY JAMES (1745–1813), an English poet laureate, a member of an old Berkshire family. In 1784 he entered Parliament, where he remained for six years. He had published several volumes of verse before his appointment in 1790 to the poet laureateship. His poems while he held this office met with constant ridicule.

Pygma′lion, in Greek mythology, a king of Cyprus and a celebrated sculptor. The most of his sculpture consisted of images of the gods, and he made one day a figure of Galatea, which was so beautiful that he fell in love with it. In response to his prayers Venus gave the statue life, and she became the bride of Pygmalion.

Pyg′mies, a race of dwarfs, first mentioned by Homer as dwelling on the shores of Ocean, and as having to sustain a war against the cranes every spring. Later writers place them mainly in Africa, and there is in fact a dwarfish race in the interior of Africa.

Pyle, HOWARD (1853–), an American artist and author, born in Wilmington, Del. He studied art in Philadelphia and began his career in New York. Making a reputation for himself almost at once, he soon returned to his native town. He is both author and illustrator of *The Merry Adventures of Robin Hood*, *A Modern Aladdin* and others. He was especially successful in juvenile work, and his best drawings were on subjects of the Colonial period of New England and New Amsterdam.

Pym, JOHN (1584–1643), an English statesman. He was a member of the Parliament of 1621 and attracted attention by his opposition to the royal encroachments on Parliamentary privileges. In the first three Parliaments of Charles I he was also prominent, and on the assembling of the Short Parliament, in 1640, he was recognized as its leader. The refusal of Parliament to grant supplies to Charles I until certain reforms had been promised was made under Pym's guidance. The impeachment of Strafford and the trial of Laud, undertaken by the Long Parliament, were conducted under his management, and he was one of the five members whom Charles attempted to arrest. He died before the war had progressed far.

Pyr′amid, a geometric solid bounded by a plane figure of three or more sides, called the *base*, and triangles, which meet at a common point, called the *vertex*. Pyramids are said to be triangular, quadrangular, pentagonal, etc., according as their bases are triangles, quadrilaterals, pentagons, etc. The pyramid is called *right* or *regular* when its base is a regular polygon and a perpendicular dropped from the vertex to the base will pass through the center of the base. The volume of a pyramid is equal to one-third the area of its base multiplied by the perpendicular distance from the vertex to the base, called the *altitude*. When the base of a pyramid is an equilateral triangle, and all its faces are equilateral triangles, it is called a *tetrahedron*. This figure is one of the five regular geometric solids.

THE SPHINX AND THE GREAT PYRAMID

Pyramids, in architecture, a colossal structure of masonry, in the form of a pyramid, used by the ancients in various parts of the world, especially in Egypt, as tombs of the kings or for religious purposes. The largest and most remarkable of the Egyptian pyramids occur in several groups on the west side of the Nile, on the border of the Libyan desert, extending for a distance of about 25 miles from north to south. There are about seventy-five in number, built chiefly of the hard limestone of the adjacent hills, but large blocks of granite brought from a distance were also used, especially on the outside. In the hills back of Thebes, in the so-called Valley of the Tombs of the Kings, there are so many of these royal sepulchers that the place has been called the "Westminster Abbey of Egypt." These structures are supposed to date from about 3000 B. C. to 2300 B. C. The stones used varied in size, but are mostly large, requiring wonderful mechanical skill to quarry them, transport them and raise and adjust them into their proper places.

An almost fabulous number of laborers were engaged in erecting the chief Egyptian pyramids, of which the group of Gizeh, four miles southwest of Cairo, in the neighborhood of the ancient Memphis, is the most remarkable. This group consists of nine pyramids, of which the three most celebrated of all, accounted among the seven wonders of the world, are the pyramid of Cheops (Khufu), called the Great Pyramid; that of Cephren (Khafra), and that of Mycerinus (Menkauru). According to Herodotus, Cheops employed 100,000 men for twenty years to complete the building of the Great Pyramid. The base forms a square, each side of which was originally 768 feet, though now, by the removal of the coating, it is only 750 feet long, and covers a space of 13 acres. The outer surface forms a series of steps, each of the average height of three feet or more. When the structure was perfect, this step formation was hidden by the coating, which rendered the sides quite smooth, and the apex, where there is now a space of twelve square yards, was no doubt originally quite sharp. The height was originally about 480 feet, but it is now only 451. The interior, entered 49 feet above the base of the north face, contains several chambers, one of which, called the King's Chamber, is 34½ feet long, 17 feet wide and 19 feet high and contains a sarcophagus of red granite. About 350 yards southwest of this pyramid is the celebrated Sphinx. The second pyramid is 690 feet square and 447 feet high. The third pyramid is only 354 feet square and 203 feet high and is the best constructed of the three.

With regard to the mode of construction of the pyramids, it is believed that when a king ascended the throne, he began to build a small, but complete tomb for himself, each year adding to it a fresh coating of stone, so that at his death the sides of the pyramid were like long flights of stairs. The size of the monument was proportioned to the builder's reign. After the body of the king had been laid in the innermost chamber, the door was walled up and the smooth sides of the pyramid made his finished tomb.

Ruins of pyramids are to be found at Benares in India and in other parts of the East. Certain monuments of the ancient inhabitants, found in Mexico, are also called pyramids. These seem to have been intended to serve as temples, the tops of them being flat and surmounted by a house, or chamber, in which sacred rites were probably performed. The largest, and perhaps the oldest of them, is that of Cholula, in central Mexico, which is said to have a base of 1770 feet and a height of 177 feet.

Pyr'amus and This'be, a pair of devoted lovers of Babylon, who, as their story is told by Ovid, were prevented by their parents from meeting openly and were therefore in the habit of secretly conversing through an opening of the wall, as their houses adjoined. They agreed one day to meet at the tomb of Ninus, and Thisbe, who was first at the meeting-place, was surprised by a lioness and took to flight. In her haste she dropped her garment, which the lioness seized in her bloody jaws. Pyramus appeared shortly afterward, and concluding from the blood-besmeared robe that Thisbe was dead, killed himself. Thisbe on her return found the body of her lover and in despair put herself to death. The story was very popular in the time of Shakespeare, who made it the subject of the burlesque interlude in *A Midsummer Night's Dream.*

Pyrenees, *pir'e neez,* a lofty mountain range, the crest of the main chain of which forms the boundary between France and Spain. It extends from the Mediterranean to the Atlantic; its length from Cape Creux, on the Gulf of Lyons, to Fuenterrabia, on the Bay of Biscay, is about 270 miles, and its greatest breadth is little more than 50 miles. It consists of two lines, which form parallel ridges about 20 miles apart, except in the center, where the distance between them is considerably greater. The descent on the south side is much more abrupt than on the north. The loftiest summits are nearly all near the center, where the culminating point, the Pic d'Anethou, reaches a height of 11,168 feet. In the Pyrenees is to be found some of the finest scenery in France. The climate is mild, and the snow line is over 1000 feet higher than the snow line of the Alps. The French Pyrenees abound in mineral springs, and a number of famous watering places are located on the northern slopes of the mountains. The chief passes of the Pyrenees are the Col de Portus, the Col de Perche and the Pass of Roncesvalles.

Pyr'ite or **Pyrites,** *pir ri'teez,* in mineralogy, a term applied to the combination of iron, copper or arsenic with sulphur, forming a sulphite. The word means *flint,* or a stone that strikes fire, and the name is applied to this class of minerals, because of the fact that when struck with steel or some other hard substance, a spark usually results. In ordinary usage, the term is confined to *iron pyrite,* which is a compound of iron and sulphur. It has a bright luster and a brassy, yellowish color, and because of this it is often mistaken for gold. The mineral occurs in crystals in the form of cubes and in mass; it is also sometimes found in fine grains in decaying rock. It is used in the manufacture of sulphuric acid and green vitriol, or copperas. *Copper pyrite* is sometimes smelted for the metal, and some deposits contain more or less gold and silver.

Pyrom'eter, an instrument used for measuring high degrees of temperature. The old style pyrometer, and one still found in physical laboratories, consists of a metallic bar, fixed in a frame so that when heated it will extend in one direction. The movable end is connected with a needle, which passes over a dial. As the bar extends, it moves the needle, and this indicates the degree of heat applied. This instrument is of no particular value, except to indicate the expansion of metals. Another pattern, in quite general use and much more successful than the first, consists of a metallic tube, with a bulb containing air, which presses against a column of mercury which it supports. The temperature is measured by the expansion of the air. The higher the temperature, the greater the expansion, and, consequently, the greater the extent to which the mercury in the tube will rise. Still another pattern consists of a coil of platinum wire, encased in a porcelain or fire clay tube. The degree of heat is indicated by the resistance which the wire affords to the passage of an electric current, this resistance being measured by a galvanometer.

Pyrotechny, *pir o tek'ny,* the science of making and using artificial fireworks, the chief ingredients of which are niter, sulphur and charcoal. Iron filings yield bright red and white sparks. Steel filings and cast iron borings contain carbon and give a more brilliant fire, with wavy radiations. Copper filings give flame a greenish tint, those of zinc a fine blue color; the sulphuret of antimony gives a less greenish blue than zinc, but with much smoke; amber, resin and common salt give a yellow fire. Lampblack produces a very red color, with gunpowder, and pink, with niter in excess. Verdigris imparts a pale green; sulphate of copper and sal-ammoniac, a palm-tree green. Lycopodium, used, also, in the manufacture of stage lightning, burns with a rose color and a magnificent flame. See FIREWORKS.

Pyr'oxene or **Augite,** a mineral composed of silica, calcium and magnesium, often combined with iron, and sometimes with zinc and manganese. It occurs in prismatic crystals and also in granular form. There are colorless varieties, to each of which a specific name is given, but they are of no special interest except to the mineralogist. The varieties containing aluminum and small quantities of potash, soda or lime are of a dark color and constitute some of the common minerals. They are found crystallized in limestone and other common rocks. Pyroxene is an important constituent of many igneous rocks, and with labradorite or magnetite it forms basalt.

Pyrox'ylin. See GUNCOTTON.

Pyrrhus, *pir'rus,* (318–272 B. C.), king of Epirus, one of the most illustrious generals of antiquity. He was placed on the throne when about twelve years of age and reigned peacefully for five years, until advantage was taken of his absence to transfer the crown to his great uncle, Neoptolemus. After serving with his brother-in-law and greatly distinguishing himself at the Battle of Ipsus, against Antigonus, Pyrrhus recovered his dominions and caused his rival to be put to death. He next contended for possession of Macedonia, and in 280 he passed over into Italy, to assist the Greeks there against Rome. He defeated the Romans in two battles, but with severe loss to himself; he then passed over into Sicily, returned to Italy again and was defeated at Beneventum in 275 B. C. He now returned to Greece and attempted the conquest of the Peloponnesus, but was killed at Argos.

Pythag′oras (about 584–510 B. C.), a Grecian philosopher and mathematician, of whose real history we know little. It is thought that he was born at Samos, that he traveled extensively and studied in many lands, that about 530 B. C. he settled in the Greek city of Crotona, in lower Italy, and there founded among the aristocracy a political or religious school, which grew to have a considerable influence. But so strange and heathenish did its doctrines appear to the people that they rose in anger and killed most of the followers of Pythagoras. It is thought that he had removed to Metapontum and died there before the uprising. Pythagoras did not put his doctrines into writing, and it is impossible to tell just what he taught and what was added by his followers, who are called the Pythagoreans. They believed in self-restraint, in temperance, obedience and simplicity. Their astronomical beliefs foreshadowed those of Copernicus, for they taught that the sun was a central fire, around which the stars revolved. They believed in the all-importance of music, and that everything in the universe is number; the soul, for instance, was related with the number six, friendship with eight, health with seven. They believed in the transmigration of souls, and it is said that Pythagoras would not beat his dog, because he recognized a friend in him. The school did much for the study of mathematics, and it is quite certain that Pythagoras discovered the proof of the proposition that the square on the hypotenuse of a right triangle is equal to the sum of the squares on the other two sides. This is known as the *47th problem in Euclid,* or the *Pythagorean theorem.*

Pythago′rean Theorem, a famous proposition enunciated by Euclid, forming the forty-seventh theorem in the first book of his *Elements.* It proves that the square of the hypotenuse of any right-angled triangle is equal to the sum of the squares of the other two sides.

Pyth′ian Games, one of the four great Grecian festivals, instituted in honor of Apollo and celebrated at Delphi. Until about 586 B. C., they were under the management of the Delphians and took place every eighth year; but after that date they were conducted by the Amphictyons and were celebrated every fourth year, prizes being given for flute playing, for athletic sports and for horse and chariot racing. Eventually, contests in tragedy, painting, sculpture and other intellectual and artistic accomplishments were added. At first, prizes of silver or gold were awarded, but afterward the simple laurel wreath and palm branch were substituted. They continued to be celebrated until the end of the fourth century of our era.

Pythias. See DAMON AND PYTHIAS.

Pythias, KNIGHTS OF, a fraternal, benevolent and social secret order, founded in Washington, D. C., in 1864. Its obligation of secrecy is more binding than that of most fraternal lodges. There is a supreme lodge, which has control over not only the order of knights, but the so-called uniform rank and the endowment, or insurance, branch, as well. The order confers three degrees, namely, page, esquire and knight. In 1906 the membership of the Knights of Pythias was 622,466, and the insurance in force amounted to more than $114,000,000.

Py′thon, a genus and family of serpents, allied to the boa family. They are not poisonous, but kill their prey by squeezing it. The pythons belong exclusively to the Old World, and are of enormous size, sometimes attaining a length of thirty feet. They are found in India and in the islands of the Eastern Archipelago, in Africa and in Australia. The head exceeds the neck in thickness, and the mouth is extremely large. The pythons suspend themselves from the branches of trees and lie in wait near water for animals which come to drink. Among the best known species is the rock snake of Ceylon, India and eastward. The African pythons are smaller than the Asiatic, and some of them are beautiful in their coloring. Certain savage tribes regard these serpents as sacred and guard them carefully in their temples. The eggs of the python are numerous, and the female coils herself about them to protect them.

Many stories have been told about the ability of the python to swallow animals of large size. Some of these stories have been greatly exaggerated, but it is true that a full-grown python can swallow a sheep or a goat. This is due to the fact that the jaws are very loosely hinged and that the halves of the lower jaw are but loosely joined by an elastic ligament. Thus the mouth may be greatly distended.

Python, in Greek legend, a huge serpent born from the slime which remained on the earth after the great deluge which destroyed all mankind except Deucalion and Pyrrha. He lived in a cave on Mount Parnassus, and none dared approach him. Finally Apollo killed him with his golden darts. The famous statue of the Apollo Belvedere represents Apollo just after he has slain the python. This myth, like many of the other Greek myths, is doubtless a mere personification of natural phenomena. The python represented the stagnant pools and marshes which breed malaria, while the slaying of the monster by Apollo was an allegory to illustrate the power of the sun (Apollo) to dry up such pestilence-breeding spots.

Pyx, a box or vessel used in Roman Catholic churches to contain the sacrament. In ancient times the pyx was shaped like a dove and was suspended above the altar. Now it is usually a gold or silver, or at least a gold- or silver-plated, vessel shaped like a cup, with a closely fitting cover. The same name is also applied to the small silver-plated box in which the host is carried to the sick.

Pyx, TRIAL OF THE. The name *pyx* is given to a chest or box at the British mint, in which specimens of the coinage are deposited. As often as the lords of the treasury desire, these gold and silver coins are tested by a jury of goldsmiths, who report as to whether or not the coins come up to the legal standard. This periodical testing is known as the *trial of the pyx.*

Pyxie, Flowering Moss or **Pine-Barren Beauty,** a small evergreen trailing plant, common in New Jersey and North Carolina. It is one of the most beautiful of the early spring plants. Its slender stems, which extend over the ground in all directions, bear small evergreen leaves, which are, however, almost hidden by the flowers. These flowers, which in the bud are pink, have, when open, a waxy white color. The pyxie is sometimes sold early in the spring in the cities of New Jersey and North Carolina.

Q

Q, the seventeenth letter in the English alphabet, a consonant having the same sound as *k* or hard *c*. It is a superfluous letter in English, as the combination *qu,* in which it always occurs, could be equally well expressed by *kw,* or by *k* alone when the *u* is silent. It did not occur in Anglo-Saxon, in which the sound *qu* was regularly written *cw* or *cu,* but was borrowed from the Norman French.

Quadrant, *kwahd′rant,* an instrument for measuring angular altitudes, variously constructed and mounted for different specific uses in astronomy, navigation and surveying. Originally it consisted of a graduated arc of 90°, with an index, or vernier, and either plane or telescopic sights, along with a plumb line or spirit level for fixing the vertical or horizontal direction. Its principle and application are the same as those of the sextant, by which it is superseded. See SEXTANT.

Quadriga, *kwod ri′ga,* an ancient two-wheeled car, or chariot, drawn by four horses abreast. It was used in racing in the Greek Olympian games and in the games of the Roman circus.

Quadrilateral, *kwahd′ri lat′ur al,* a four-sided polygon. A *trapezium* is a quadrilateral no two of whose sides are parallel; a*t rapezoid* is a quadrilateral two of whose sides are parallel, and a *parallelogram* is a quadrilateral whose pairs of opposite sides are parallel. Three classes of parallelograms are important—the rectangle, all of whose angles are right angles; the rhombus, none of whose angles are right angles and whose adjacent sides are equal, and the rhomboid, none of whose angles are right angles and whose adjacent sides are not equal. See POLYGON.

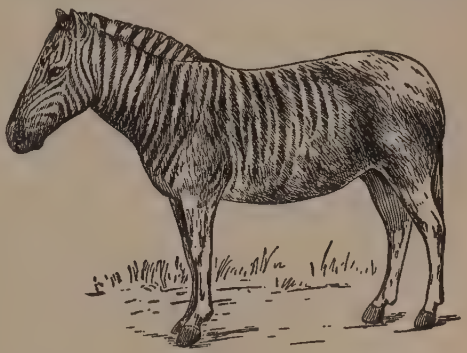
Quadrille, *kwahd ril′,* a dance of French origin, which consists generally of five consecutive figures or movements, danced by four couples, each forming the side of a square. The time varies between triple and duple time.

Quadrumana, *kwahd ru′ma na,* the monkeys, lemurs and apes, the group of primates which use their feet like hands. They are not regarded as a distinct class by the modern zoölogist, who includes most of the two-handed mammalia with the Quadrumana in one order. See PRIMATES.

Quadruple, *kwahd ru′p′l,* **Alliance,** an alliance concluded in 1718 by Great Britain, France and Austria, joined by Holland in 1719, for the maintenance of the Peace of Utrecht. The occasion of the alliance was the seizure by Spain of Sardinia and Sicily in 1718, both of which she was forced to give up. Another quadruple alliance was that formed by Austria, Russia, Great Britain and Prussia in 1840, for the purpose of checking the ambitious plans of Mehemet Ali.

Quaestor, *kwes′tor,* the name of certain magistrates of ancient Rome, whose chief office was the management of the public treasury. Quaestors accompanied the provincial governors, received taxes and paid the troops. The office at first could be held only by patricians, but in 421 B. C. the number, which had formerly been two, was doubled, and plebeians became eligible. The number was further increased as province after province was added to the Roman territory, till in the time of Julius Caesar it reached forty.

Quag′ga, a species of the horse genus, closely allied to the zebra. It was formerly found on the plains of southern Africa. Though striped



QUAGGA

like the zebra on the body, it yet possessed no bands on the limbs. It was of a dark or blackish-brown color on the head, neck and shoulders, and the back and hind quarters were of a lighter brown. The under parts of the body were white, the upper parts of the legs and tail being marked by whitish bars. The quagga was smaller than the zebra and bore a closer resemblance to the horse. Its food consisted of grasses and mimosa leaves. It was hunted extensively by the Boers, both for flesh and hide, and it is now thought to be extinct. The name quagga is now applied to *Burchell's zebra.* See ZEBRA.

CALIFORNIA QUAIL

Quail, a small bird of the partridge group, in the grouse family. There are a number of different species, of which the true quail, a native of Europe, was a great favorite with the ancients, who used to keep the birds in captivity and make them fight for the amusement of their owners. It is a migratory bird, and is about eight inches in length. Its upper parts are brownish, with light and dark markings, and its under parts are yellowish. In the United States the common quail is the bird whose clear whistle and call of "bob-white" has given him his common name. He is a trim, plump bird of brownish-red color, whose head is marked with white and black bands. The rude nest is built on the ground and contains from eight to ten clear white eggs. As soon as the young are hatched they leave their nest, but they run about with their mother, even through the winter. In the more thickly populated states the flesh of the quail has caused it to be hunted until it has been practically exterminated. In the Southern states the bob white is called the partridge. The California quail, which carries an erect crest of several long feathers, is a more beautiful bird, with richer drab, brown and black coloring.

Qua'kers or **Society of Friends,** a religious sect founded in England in 1648 by George Fox, a man of pure life and zealous devotion. From the first they were persecuted on all sides, and some of them were punished by the authorities with transportation. Their belief, as originally announced and not materially changed to this day, differs but little from the main creeds of orthodox believers. The principal feature which characterizes their faith is the doctrine of the "light of Christ in man." They found this doctrine on the view of Christ given by Saint John, where, in the first chapter of his gospel, he speaks of the "word" as the "life" and "light of man," "the true light," "the light that lighteth every man that cometh into the world."

In 1827, Elias Hicks, a Quaker of great influence and strong mental gifts, created a schism among the denomination in the United States by preaching a denial of the miraculous conception and divinity of Christ and the inspiration of the Scriptures. Nearly one-half of the Quakers of this country became converts of Hicks, and they have since been known as Hicksite Quakers, or Friends, while the adherents to the old faith are recognized as Orthodox Quakers. In England the denomination has greatly diminished in later years. The Quakers are marked by a number of peculiarities, both in their method of worship and in their ways of life. They have no stated ministry, and in conducting their meetings each individual speaks "as moved by the spirit." They do not believe in baptism and the Lord's Supper, and they keep no holy days except Sunday. The congregation is divided according to sex, the males sitting on one side of the "meeting-house" and the females on the other. It is the duty of the women to inspect and relieve the wants of the poor of their own sex and to look after proposals for marriage. The Quakers neither take nor administer oaths, and they object to war in all its forms, to "balls, gaming places, horse races and play houses," to an indulgence in music and to the reading of novels, plays or romances. In the different gatherings all questions of discipline and executive management are settled. But the government of the body is exceedingly simple, and it is seldom that any serious differences occur among its members. Their number in the United States in 1905 was 117,065.

Quam'ash or **Camass,** the North American name of a plant of the lily family. Roasted quamash bulbs are much eaten by the indians, who prepare them by baking them in a hole in the ground, then pounding and drying them into cakes.

Quantity, *kwahn'ti ty,* that property of anything by virtue of which it is capable of being measured, increased or diminished; also, anything that can be measured, increased or diminished, as space, time, number, weight, mass, force. In mathematics, the symbols representing quantities are also called quantities (See IMAGINARY QUANTITY; NEGATIVE QUANTITY; VARIABLE QUANTITY). In grammar, quantity signifies the time in which a syllable is pronounced.

Quapaw, *kwah'paw,* a Sioux tribe, better known as the Arkansas, now consisting of a few hundred persons living upon a reservation in Oklahoma. They were relatives of the Kaw, Ponca and Osage tribes, but early lost their position, because of their wars and dissipations.

Quarantine, *kwor'an teen,* originally the period of forty days during which a ship coming from a port suspected of contagion, or having a contagious sickness on board, was forbidden intercourse with the place at which she arrived. By act of Congress passed in 1888 national quarantine stations were established; and it is made a misdemeanor punishable by fine or imprisonment, or both, for the master, pilot or owner of any vessel to enter a port of the United States in violation of the act or of regulations framed under it. In most of the states and cities of the United States, a house or a whole town may be quarantined and its inhabitants prevented from leaving. Oftentimes the laws are very strict, as is usual concerning homes containing cases of diphtheria, smallpox or scarlet fever, when for a month or more no one but the physician may leave, provisions are left outside and nothing can be carried from the house. Before the quarantine is lifted, the premises are fumigated or thoroughly disinfected in other ways.

Quart, *kwawrt,* a measure of both dry and liquid capacity in the English system of weights and measures. As a unit of dry capacity it contains 67.2 cubic inches, is divided into two pints and is approximately equivalent to 1.101 liters. As a unit of liquid measure it contains 57.75 cubic inches, is also divided into two pints and is approximately equivalent to .9463 liters. See WEIGHTS AND MEASURES; METRIC SYSTEM.

Quarter, the name of two measures, one of weight and the other of capacity. The first is the fourth part of a hundredweight, 28 pounds or 25 pounds, according to whether the hundredweight be considered to contain 112 or 100 pounds. The second, which is used especially in measuring grain, contains 8 bushels.

Quart'erstaff, an old English weapon, formed of a stout pole about 6½ feet long, generally loaded with iron at both ends. It was grasped by one hand in the middle, and by the other between the middle and the end. By shifting the latter hand from one quarter to the other the staff was given a rapid whirling motion that made it a highly dangerous weapon.

Quartz is the most abundant mineral and forms a portion of nearly all rocks. Pure quartz looks like the best quality of glass, for which it might be easily mistaken. A quartz crystal has the form of a six-sided prism, with a pyramid at the end. The prisms are so hard that one can easily write on glass with them. When colorless this form of quartz is called rock crystal, and it is used to some extent in making ornaments and lenses for spectacles. When colored, quartz crystals take different names (See PRECIOUS STONES).

The most common forms of quartz occur in rocks. They vary in color from milky white to black. Red and brown quartz rocks are called jasper. Sandstone is formed of grains of quartz cemented together by some other mineral. Quartz forms a good proportion of granite, and it can be easily detected by its resemblance to broken glass. When quartz is ground to a powder and heated with potash, lime or soda, it melts and forms glass. The waters of many hot springs dissolve quartz, and when they cool, it forms in beautiful crystals around the edges of the springs. Some of the celebrated springs in Yellowstone Park are ornamented in this way.

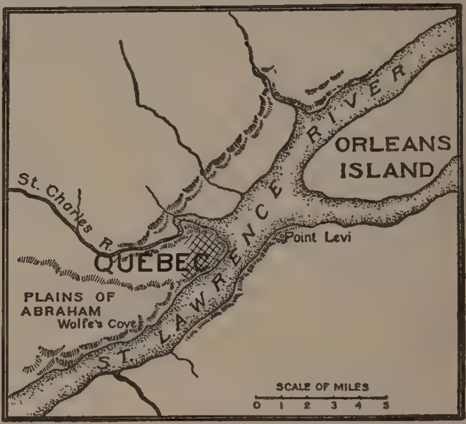
Quartzite, a metamorphic, stratified, granular, crystalline rock, consisting entirely, or almost entirely, of quartz. It is usually a sandstone which has been altered by heat and is of a grayish or pinkish-gray color, on account of a slight trace of iron.

Quassia, *kwosh'ea,* or **Bitter Ash,** a genus of South American tropical plants, consisting of trees and shrubs. The wood of two species is known in commerce by the name of quassia. One, a native of Panama, Venezuela, Guiana and northern Brazil, is a small tree with handsome crimson flowers; the other is a native of Jamaica. Both kinds are imported in billets and are inodorous, but intensely bitter, especially the Jamaica quassia. It is a pure and simple bitter, possessing marked tonic properties. An infusion of quassia, sweetened with sugar, is useful for destroying flies. Jamaica quassia was formerly substituted by some brewers for hops, but it is now prohibited under severe penalties.

Quaternary, *kwah tur'na ry,* **Period,** the name given that division of geologic time extending from the Tertiary period to the present. It is also called the *Age of Man.* On account of a difference in classification between European and American geologists, there is some confusion in the use of this term. The English geologist Lyell united the Glacial and Champlain periods under the name Pleistocene, and in so doing he divided the Quaternary into two periods, the Pleistocene and the Recent. The terms *Quaternary* and *Pleistocene* are also used synonymously in some classifications. The American geologist Dana divided the Quaternary into three periods, the Glacial, the Champlain and the Recent. American geologists usually follow Dana, while the Europeans follow Lyell. See Geology; Glacial Period; Tertiary Period.

Quay, Matthew Stanley (1833–1904), an American politician, born at Dillsburg, Pa. He graduated at Jefferson College in 1850, was admitted to the bar four years later, served as lieutenant of Pennsylvania reserves in the Civil War and in 1865 was chosen to the state legislature. In 1872 he became secretary of state and was reëlected until 1878 and again from 1879 to 1882. Three years later he was made state treasurer, and from that time forward he took a prominent part in politics, as a member and, for a time, as chairman, of the Republican national committee. In 1887 he was chosen United States senator, serving until 1899, when he was tried for misappropriation of public funds, but was acquitted. On the same day he was reappointed United States senator and was reëlected in 1901.

Quebec', the capital of the Province of Quebec, and the oldest city of Canada, situated on the Saint Lawrence River, about 300 mi. from the Gulf of Saint Lawrence, 180 mi. e. by n. of Montreal and 430 mi. n. e. of New York. The city is built upon and around a promontory called Cape Diamond, whose highest point is 353 feet above the river. It is divided into the upper and lower towns. The lower town is built along the river banks, at the foot of the bluff, and contains the wholesale district, the wharves, the railway depots and the principal business establishments. The upper town is built upon a terrace and on the top of the bluff and is from 100 to 300 feet higher than the lower town. The two parts of the city are connected by steep, narrow streets and by flights of steps, some of which have been cut in the rock. The upper town is devoted to residences, hotels, churches, convents and retail establishments. A portion of this part of the city is enclosed by a high wall, which extends around the point of the bluff and was formerly entered through a number of gates, though all but two of these have been removed. In general, the streets are narrow and irregular, except in the more level parts of the upper town, where the city is regularly laid out. The highest point of the bluff, known as Cape Diamond, is occupied by the citadel, which encloses an area of about 40 acres and is usually occupied by a garrison of Canadian militia. The remarkable strength of this fortress during the French and Indian Wars gave Quebec the name *Gibraltar of America,* but the fortifications would afford little resistance to a modern warship. To the south of the citadel are the Plains of Abraham, on which was fought the battle that resulted in transferring all the French dominions in America to the British (See Quebec, Battle of). At the foot of the citadel and extending a little to the north, occupying a terrace about a quarter of a mile long, is Dufferin Terrace, a celebrated promenade 200 feet above the river, from which one of the finest views of the city and the surrounding country can be obtained. Back of this terrace is the governor's garden, in which there is a monument to Wolfe and Montcalm.



Quebec more closely resembles an old European town than any other American city. Many of the older buildings are constructed of cobblestones, held together by mortar, and nearly all are of a gray limestone found in the vicinity. With few exceptions the roofs are covered with tin, and the style of architecture is that of the

French cities of the days of Louis XVI. These features, combined with its narrow, winding streets, give the city a quaint and interesting appearance. Among the most important public buildings are the houses of parliament and departmental buildings of the provincial government, the postoffice, the customhouse, the city hall, the armory and the exhibition building, the courthouse and a number of business blocks and banks. Among the churches, the Basilica, formerly the Catholic cathedral, situated on one side of Market Square in the upper town, is of first interest. It seats an audience of about 4000 and contains a number of paintings of Van Dyck, Ceracci, Hallé and other distinguished painters. Near by are the buildings of Laval University, the chief Catholic college of Canada, noted for its museum of indian antiquities (See LAVAL UNIVERSITY). The English Cathedral, the First Methodist Church and Saint Andrew's Presbyterian Church are also worthy of mention. Quebec contains a number of large convents. Among these, the Ursuline Convent is celebrated for its large building and beautiful grounds. It is also of historic interest, because within the building are the remains of Montcalm. Hotel Dieu is also worthy of mention, because of the large hospital connected with it. Nine miles south of the city are the Falls of Montmorency, formed by the Montmorency River, where it plunges over the bluff to reach the Saint Lawrence. This little cascade is 275 feet high and is famous for its beauty. Across the river, near Levis, are the Chaudière Falls, 350 feet wide and 150 feet high. Another object of interest is the great cantilever bridge, the largest of its kind in the world, connecting Quebec with Levis on the opposite bank of the Saint Lawrence. The shipping of lumber and the manufacture of textiles, boots and shoes are the most important industries.

The city of Quebec was first visited by Cartier in 1535 and was then occupied by the indian village of Stadacona. The first settlement was made by Champlain in 1608. The city was captured by the English in 1629 and was restored to the French three years later. In 1690 the New England colonists made an expedition against it, but failed. Another similar expedition which also resulted in failure occurred in 1711. During the French and Indian Wars it was an important military post and the center of French activities. It fell into the hands of the English in 1759, and the result of the capture was confirmed by the Treaty of Paris four years later. Quebec was the capital of Canada until 1858, when the capital was transferred to Ottawa, Quebec remaining only as the capital of the province. The city has grown very slowly. Population in 1901, 68,834, fully five-sixths of which are of French descent. Consult Parker's *Quebec: The Place and the People.*

Quebec, a province of the Dominion of Canada, bounded on the n. by Ungava, from which it is partly separated by the East Main and Hamilton rivers; on the e. by the Atlantic Ocean; on the s. by the Gulf of Saint Lawrence, New Brunswick, Maine, Vermont, New York and Ontario, and on the w. by Ontario. The northwestern corner touches James Bay, and the western part of the southern boundary is formed by the Ottawa River. The greatest extent from east to west is about 1000 miles, and from north to south, about 500 miles. The area is 370,756 square miles, of which 2900 square miles are water. This water area is exclusive of the Gulf of Saint Lawrence. In size, Quebec is about equal to Texas and Nebraska combined.

SURFACE AND DRAINAGE. The land along the Saint Lawrence River and between the Saint Lawrence and Richelieu is low and level, but with this exception that portion of the province south of the Saint Lawrence is traversed by the Notre Dame Mountains, which are an extension of the Green Mountains and follow the course of the river in a northeasterly direction to Gaspe Peninsula. These mountains are really a low plateau, but here and there are a few prominent peaks, among which Black Mountain, Beloeil, near the Richelieu River, and Sutton Mountain, farther east, are the most prominent. Mount Royal, near Montreal, is also noticeable, but it is considered to be of another formation. North of the Saint Lawrence is the Laurentian Plateau, consisting very largely of a rocky, undulating surface, with but little good soil, though a large portion of the region is quite heavily timbered. This plateau is traversed by the Height of Land, which separates the rivers flowing into the Atlantic from those flowing into the Arctic Ocean. In the western part of the province this reaches an altitude of 1000 feet, but it gradually rises toward the east, until, along the northern banks of the Saint Lawrence, bluffs ranging from 1500 to 1900 feet are found.

The Saint Lawrence and its tributaries drain nearly all of the province, and to the influence of this magnificent river Quebec owes very much of her development and prosperity. The chief tributaries of the Saint Lawrence from the north are the Ottawa, the Saguenay, noted for the grandeur of its scenery, the Manicougan and the Natashquan. The province contains a number of lakes, which are north of the Saint Lawrence. Lake Saint John, on the Saguenay, is reached by rail and frequented by tourists. The largest lake wholly within the province is Mistassini.

Climate. Quebec has a cool temperate climate. The winters are long and severe, extending from November to April, and during the coldest weather the thermometer is liable to reach 20° below zero. The summers are warm, but not excessively hot. In general, the air is dry and bracing, and the climate is remarkably healthful. The rainfall is ample for agricultural purposes, and a large portion of the province is covered by deep snow during the winter.

Mineral Resources. The mineral resources, though ample, have not been extensively developed. This is owing to the absence of coal and the necessity of exporting ore to the United States or Great Britain. Iron, copper, lead and some graphite are found in the region south of the Saint Lawrence River, and in the eastern section of this region are the most celebrated asbestos mines in the world. These mines are fully developed and furnish nearly all the asbestos used in America and Europe. Granite is quarried in the counties north of Vermont and New Hampshire; limestone is quite widely distributed over the province, and extensive peat beds occur in the lowlands, though they have as yet been but little used.

Agriculture. Agriculture is the chief industry; by far the larger portion of the inhabitants are engaged in it. The most fertile lands are in the river valleys and in that part of the province south of the Saint Lawrence. The chief crops are oats, wheat, potatoes, peas, buckwheat, turnips and tobacco. In some of the more favored localities, apples and plums of excellent quality are raised, and small fruits can be successfully grown in almost any part of this section of the province. The raising of live stock is an extensive branch of industry, and dairying has become an important source of income.

Other Industries. Originally nearly all of the province was covered with forests, and that portion of the territory north of the Saint Lawrence still contains extensive tracts of pine, hemlock, spruce and some hard woods, and it is in this region that the lumber interests of Quebec are found. Among the manufacturing industries, the production of lumber and timber products is the most important. Other manufactures include sugar, boots and shoes, cotton and woolen goods, wooden ware, matches, potash and other chemicals. The chief industrial centers are Montreal and Quebec. The streams and lakes abound in fish, and the taking of fish is an industry of considerable importance, the annual catch being valued at about $2,000,000. In the extreme northern part of the province are many fur-bearing animals, and hunting these and curing their furs is a source of income to the inhabitants of the region.

Transportation and Commerce. The Saint Lawrence is navigable for large ocean steamers as far as Montreal and furnishes ample water transportation for the interior, as well as for those towns along its banks. The Grand Trunk and other railways thread that section south of the Saint Lawrence, so that all counties and nearly all townships in this region have ready access to the railway, while the Canadian Pacific and the Intercolonial systems have lines extending from Quebec to Montreal and westward on the north side of the Saint Lawrence. Numerous short lines are found in those regions where industries warrant their construction, and a branch has been extended northward to Lake Saint John.

The commerce of the province is considerable, the exports consisting of lumber, stock and dairy products and some manufactures, while the imports consist of manufactured goods. Most of the foreign trade is with Great Britain and the United States.

Inhabitants and Language. The province was originally settled by the French, and the descendants of these colonists constitute more than three-fourths of the population. They have maintained not only the language, but many of the institutions and customs, of their ancestors, so that the Province of Quebec is more completely foreign than any other portion of the Dominion. In their habits of dress, in the construction of their dwellings and in their social life, the French Canadians form a class by themselves. In general they are industrious, frugal and prosperous. Notwithstanding the fact that thousands of them have emigrated to the New England states, the province increased very materially in population between 1891 and 1901, the date of the last census.

Government and Religion. The chief executive is a lieutenant governor, appointed by the governor of the Dominion, with the advice of his council. The lieutenant governor is assisted by a council of 6 members, appointed for life. The legislature consists of a council of 24 members, appointed for life, and an assembly of

75 members, chosen by public vote. The administration of justice in Quebec differs quite materially from that in other Canadian provinces, since the French law and French system of courts are in vogue, this privilege having been granted the early inhabitants when Quebec became British territory.

About six-sevenths of the population profess the Roman Catholic faith. The remainder are divided among the various Protestant denominations, of which the Anglican Church, the Presbyterians and the Methodists have the largest followings.

EDUCATION. The public schools are under the administration of a superintendent of instruction, but a dual system is maintained, both the Catholics and Protestants having charge of schools of their respective faiths and having a right to prescribe certain religious instruction. Two provincial school committees are maintained, one being Catholic and the other Protestant. The local management of the schools rests with township or district officers. The province maintains a normal school, and there are a number of colleges and secondary schools under religious denominations. The most noted among the higher schools are Laval University at Quebec, a Catholic institution, and McGill University at Montreal, non-denominational, by far the most widely known of the educational institutions in the Dominion.

CITIES. The chief cities are Quebec, the capital; Montreal, Saint Henri, Hull and Sherbrooke, each of which is described under its title.

HISTORY. Cartier was the first white man to visit the province. In 1608 Champlain made the first settlement by founding a colony at Quebec (See CHAMPLAIN, SAMUEL). Seven years later the Recollet and Jesuit missionaries began their work among the indians and explored a large part of the province. However, for a long time but few permanent settlements were made, those coming to the country from France being devoted to trading with the indians and to exploring the wilds of the forests. Indian wars undoubtedly had much to do with preventing settlements during this period. After several changes, the Province of Quebec finally became a British province in 1763. Soon after, the region was divided into two provinces, Quebec being known as Lower Canada, or Canada East, and Ontario as Upper Canada, or Canada West. The provinces, however, were reunited in 1841 and remained under one colonial government until the formation of the Dominion, in 1867, when Ontario again became independent, both provinces joining the federation. Population in 1901, 1,620,974.

Quebec, BATTLE OF, a memorable battle on the Plains of Abraham, before the city of Quebec, on September 13, 1759. The French garrison of the town, numbering about 16,000, were commanded by Montcalm, while the British attacking party were under General James Wolfe. After numerous vain attempts to take the citadel by storm, General Wolfe, finding a secluded cove in the river bank, landed his forces and led them by a dangerous and difficult path to the Plains of Abraham, back of the fort on the plateau above. There he gained a decisive victory over the French force, who, though fighting bravely, were overpowered and finally compelled to surrender. Both Montcalm and Wolfe were killed in the contest. The fall of Quebec was the death blow to French dominion in America.

Quebec was also the scene of a brilliant but disastrous exploit upon the part of the American forces at the opening of the Revolutionary War. Two forces, one under Montgomery, who had reached Quebec by way of Lake Champlain and the Saint John's River, and another under Benedict Arnold, who had marched through the Maine woods, made a combined assault on December 31, 1775. Though the Americans conducted themselves with the greatest bravery and were led by skilful and daring commanders, they were finally repulsed, owing chiefly to the death of General Montgomery and the injury to General Arnold. They were finally compelled to withdraw, leaving General Dan Morgan and his company of Virginia marksmen prisoners in the hands of the English.

Quebec Act, an act passed by the British Parliament in 1774, in order to provide a government for the Province of Canada. Among other things it extended the boundaries of the province to include all the Northwest Territory; it substituted French civil law for English law; it established an appointive legislative council, rather than a representative council; it practically established the Catholic religion, on account of the great preponderance of colonists of Catholic belief in Canada. The act aroused the greatest indignation in the thirteen colonies, since it established a despotic English government on their borders and brought them, almost all earnest Protestants, into contact with a strongly Catholic community.

Queen, the wife of a king. In Great Britain the queen is either *queen consort,* that is, merely the wife of the reigning king, and in reality his subject, not his equal; or *queen regent*, holding the crown in her own right and having the same powers, prerogatives and duties as if she were a king and her husband a subject; or *queen dowager*, that is, widow of the king, enjoying most of the privileges which belonged to her as queen consort. In Prussia, Sweden, Belgium and France there can be no queen regent. See SALIC LAW.

Queen Anne's War. See FRENCH AND INDIAN WARS.

Queen Charlotte, *shahr'lot,* **Islands,** a group of islands in the Pacific Ocean, off the coast of British Columbia, north of Vancouver Island. They were discovered by Cook, about 1770, and were annexed to the British dominions in 1787. The more northern of the two larger islands is called Graham Island, and the more southern is Moresby Island. The area of the two, with a number of smaller islands, is 5100 square miles. All the islands are covered with magnificent forests; gold-bearing quartz of rich quality has been found, and copper and iron ores and a fine vein of anthracite coal also exist. The islands form part of British Columbia.

Queen Charlotte Sound, a channel in the Pacific Ocean, separating Vancouver Island from the mainland of British America and forming the first of a long series of inlets, continued along the north and east of that island.

Queens'berry, JOHN SHOLTO DOUGLAS, Marquis of (1844–1900), a famous English patron of sports. He served in the army for several years after receiving his father's title of marquis and later represented Scotland in the House of Lords. He is most famous as a patron of the art of boxing, and his name is given to the rules drawn up in 1867, which are most generally followed in boxing and pugilistic exhibitions.

Queens'land, a state of the commonwealth of Australia, comprising the whole northeast portion of Australia north of New South Wales and east of South Australia and its Northern Territory, being elsewhere bounded by the Gulf of Carpentaria, Torres Strait and the Pacific. The most northern part forms a sort of peninsula, known as York Peninsula. Queensland has an area of about 668,500 sq. mi. Toward the west a large portion of the surface is dry and barren, but toward the east, and for a long stretch along the coast, boundless plains, or downs, admirably adapted for sheep walks, and ranges of hills, generally well wooded and intersected by fertile valleys, form the prevailing features of the country. The coast is skirted by numberless islands, and at some distance from the coast is the Great Barrier Reef. The highest mountains are near the coast, the greatest elevation being about 5400 feet. The principal rivers are the Brisbane, the Burnett, the Pioneer, the Fitzroy and the Burdekin, flowing into the Pacific, and the Flinders and the Mitchell, flowing into the Gulf of Carpentaria. Some of these streams are navigable for a considerable distance. The coast is indented with many bays, affording capacious natural harbors, which have already been brought into practical use as the outlets for the produce of the adjacent districts.

The climate is healthful, and the temperature is comparatively equable. The mean temperature at Brisbane is 69°, and in the hottest parts of the state the temperature seldom rises above 97°. The rainfall in the interior is scanty and variable; the mean fall at Brisbane is about 50 inches, and in the northern coast districts it sometimes reaches 150 inches.

The native animals and plants are similar to those of the rest of Australia. There are many kinds of valuable timber trees and, a rare thing in Australia, a few good native fruits. Sheep farming is the chief industry, but agriculture, cattle rearing and mining are also important. The soil and climate are well suited for the production of all the ordinary cereals, as well as maize, tobacco, coffee, sugar and cotton. The chief products are sugar, maize, Irish and sweet potatoes and semi-tropical fruits. Sugar growing is becoming a very important industry.

Gold, tin, lead and copper are the principal minerals. The production of gold has averaged in value more than £2,000,000 ($9,720,000) annually since 1889. Coal and plumbago are found in large quantities, and cinnabar, antimony and manganese are also among the mineral products. In the north, pearl fishing is actively carried on. The manufactures are unimportant. The principal manufactories, or works that may be classed as such, are sugar mills, steam sawmills, soap works, agricultural implement works and distilleries. There are now over 2800 miles of railways in operation, as well as efficient telegraph and telephone systems.

The executive department of the government is vested in a governor, who is assisted by a council of nine members. The legislative council consists of thirty-nine members, and the assembly has seventy-two members, elected by the people for five years, and representing sixty electoral districts. The capital of the state is Brisbane.

The first settlement of Queensland took place in 1826, when the territory was used as a place of transportation for convicts, who continued to be sent there till 1839. In 1842 the country was opened to free settlers. It was originally a part of New South Wales and was organized as a separate colony in 1859. In 1899 the colony accepted the constitution of the Australian Commonwealth. Population in 1904, 521,655.

Queen's Tobac'co Pipe or **King's Tobacco Pipe,** the name popularly given to a furnace in London, situated in the northeast corner of the tobacco warehouses belonging to the London docks, so called because it was formerly used for burning all sorts of contraband or smuggled articles seized by the customhouse officers, but especially tobacco and cigars. Such goods are now usually sold.

Queens'town, formerly Cove of Cork, a maritime town of Ireland, an important naval station 10 mi. e. s. e. of Cork, on the south side of Great Island, which rises abruptly out of Cork harbor to a considerable elevation. The streets rise above one another and present a very picturesque appearance. It is the port for the transmission of American mails and is a chief emigration station. It has little trade and no manufactures, being almost solely dependent on the military and naval establishments in its vicinity and on the numerous visitors attracted by the singular beauty of the place and by its delightful climate. Population in 1901, 7909.

Queenstown Heights, Battle of, a battle of the War of 1812, fought at Queenstown Heights, near Niagara Falls, October 13, 1812. The American force was led by General Van Rensselaer, who crossed Niagara River from Fort George and attacked the Canadian force under General Brock, encamped at Queenstown. Van Rensselaer's expedition was a failure, owing to the absence of effective support from other commanders. The most important event connected with the battle was the death of General Brock, who was mortally wounded in the action. A beautiful monument was erected in 1824 by the Ontario legislature on the spot where he fell.

Quelpaert, *kwel'pahrt,* a rock-bound island, 45 mi. long by 20 mi. broad, off the south coast of Korea, to which it belongs. The soil is fertile, the climate is temperate and there is a large population. The interior is mountainous, and one summit, the volcanic Mount Auckland, is 6700 feet high.

Queretaro, *ka ray'ta ro,* a city in Mexico, capital of the State of Queretaro, on a plateau 6166 feet above sea level, 110 mi. n. w. of the City of Mexico. Among the more noteworthy public edifices are the principal church, a magnificent and richly-decorated structure; a convent, and various hospitals and asylums. There is an aqueduct about two miles long, with arches 90 feet high, which communicates with a tunnel in the opposite hills and brings a copious supply of water from a distance of six miles. The city has cotton manufactures of great importance. Maximilian of Austria was made prisoner and executed here in 1867. Population in 1900, 33,152.

Quetzal, *kwet'sawl,* a most beautiful Central American bird, of the trogon family. It is about the size of a magpie, but it carries gorgeous emerald feathers, from three to three and a half feet in length. These are not strictly the tail-feathers, which are shorter and black and white, but the upper tail-coverts, growing beyond and covering the tail proper. The back, head, crest, throat and chest are of the same rich emerald hue, and the lower parts are a brilliant scarlet. The female does not have the long feathers, and is much plainer in her coloration. The feet of the quetzal are very small and entirely unfit for walking.

QUETZAL

Quetzalcoatl, *kets'al ko aht''l,* the god of the air of the ancient Mexicans, who presided over commerce and the useful arts and is said to have predicted the coming of the Spaniards to Mexico.

Quezaltenango, *ka sahl'ta nahn'go,* a city of Central America, in Guatemala, capital of the Department of Quezaltenango. It has cotton, linen and woolen manufactures and a considerable trade. It was founded by the Spaniards in 1524. Population, about 23,000.

Quichua, *ke choo'a,* the name of a native race of South America, inhabiting Peru and parts of Ecuador and Bolivia. With the Aymara the

Quichua composed the larger portion of the population of the empire of the Incas. The Quichua language, which was formerly the state language of the Incas, is still the chief speech of Peru, of a large portion of Bolivia, of the part of Ecuador bordering upon Peru and of the northern section of the Argentine Republic. It is one of the most beautiful and at the same time comprehensive native tongues of America.

Quick, Robert Herbert (1831–1891), an English educator, born in London. He was educated at Cambridge University and was ordained for the Church. However, he soon engaged in the work of teaching, to which he devoted his life. He is known in America through his *Essays on Educational Reformers,* which is of great value to teachers and is widely read. He was the first to deliver lectures at Cambridge on the history of education.

Quick Grass. See Couch Grass.

Quick'sand, a large mass of loose or moving sand, mixed with water, formed on many sea coasts and at the mouths of rivers. It is composed of smooth, water-worn particles of sand, which do not mass together under pressure, but yield readily. Bodies which fall into such sand are soon engulfed and often sink to incredible distances beneath the surface.

Quick'silver. See Mercury.

Quil'ler-Couch, *kooch,* Arthur Thomas (1863–), an English author, born in Cornwall. He was educated at Clifton College and at Trinity College, Oxford, where he later became a lecturer upon the classics. Removing to London, he wrote for the *Speaker* for many years. In 1891 he returned to his native county. His works consist of novels, essays and poems. Probably the best known are *Dead Man's Rock, Noughts and Crosses, The Delectable Duchy, The Adventures of Harry Revel* and *The Ship of Stars.* He was chosen to complete Robert Louis Stevenson's novel, *Saint Ives.*

Quillota, *keel yo'ta,* a town in Chile, in the province of Valparaiso, on the Aconcagua River, 26 mi. n. e. of Valparaiso. The copper mines in the vicinity are among the richest in Chile. The town has suffered severely on different occasions from earthquakes. Population in 1902, 9876.

Quince, *kwins,* a fruit related to the apple and the pear. The quince tree, which is supposed to be a native of western Asia, is now cultivated throughout Europe and in many parts of the United States, for its handsome, golden yellow fruit, which, though hard and unpleasant when plucked from the tree, becomes excellent when boiled and eaten with sugar or when preserved in syrup or made into marmalade.

Quincy, *kwin'zy,* Ill., the county-seat of Adams co., 265 mi. s. w. of Chicago, on the Mississippi River and on the Chicago, Burlington & Quincy, the Wabash and the Quincy, Missouri & Kansas City railroads. The city has excellent transportation facilities and a valuable trade in farm produce and manufactured goods. The industrial establishments include stove foundries, machine shopes, breweries, show case works, a packing house, brickyards, flour mills and manufactures of wagons, agricultural implements, engines and various other articles. The city has an elevated location on a bluff 120 feet above the river; it contains the Saint Francis Solanus College, an industrial school for boys, formerly known as Chaddock College, the Saint Mary's Institute and several commercial schools. Other important institutions are the state soldiers' and sailors' home, Saint Mary's and Blessing hospitals, a conservatory of music and several homes for orphans and the aged. The Federal building, the courthouse and the city hall are prominent structures. There are six parks, covering more than 100 acres. Quincy was settled in 1822 and was chartered as a city in 1839. Population in 1900, 36,252.

Quincy, Mass., a city in Norfolk co., on Quincy Bay, adjoining Boston on the south, and on the New York, New Haven & Hartford railroad. It is primarily a residence place, but it also has extensive granite works, a large shipbuilding plant, machine shops and other factories. The city has more than 2500 acres of public parks, of which the most prominent are the Merrymount and the Faxon. It contains the Woodward Institute, for girls; the Adams Academy, the Crane Public Library and a city hospital. The first railroad in New England was built here, in 1826. It was operated by horses and was used for hauling stone in the construction of the Bunker Hill Monument. The place was settled in 1625 as Mount Wollaston. It remained a part of Braintree until its incorporation in 1792, when it was named in honor of John Quincy. It was the birthplace of John Adams, John Quincy Adams and John Hancock. Population in 1905, 28,076.

Quincy, Josiah (1744–1775), an American statesman and soldier, born in Boston. He graduated from Harvard University and was admitted to the bar and attained high rank as a lawyer. He early took a firm stand in opposition to the policy of Parliament in America, but was moderate in his discussion of the issues. With John Adams he defended the British soldiers who were assaulted during the Boston Massacre and thus incurred the antagonism of influential citizens. As a pamphleteer during all the pre-Revolutionary period, he exerted a great influence, and in September, 1774, he became agent of the patriot party in England. He died upon the return voyage in the following year.

Quincy, JOSIAH (1772–1864), an American lawyer and orator, son of Josiah Quincy (1744–1775). He was born in Boston, was educated at Harvard and was admitted to the bar. He early took an active interest in politics, as an extreme Federalist, was elected to the state legislature and in 1805 entered the House of Representatives, where he won distinction for his eloquence. He vigorously opposed the Republican administrations of Jefferson and Madison and particularly denounced the purchase of Louisiana, declaring it a just excuse for a division of the Union, and later opposed the War of 1812. In that year he retired from Congress, devoting himself thereafter chiefly to agriculture. However, he was elected to the Massachusetts house of representatives and later became mayor of Boston. In 1829 he became president of Harvard College, where he served with distinction until 1845.

Qui′nine, a white, crystalline substance, inodorous, very bitter and possessing the power to allay fevers. It is obtained from the bark of several trees of the Cinchona family, but perhaps the best is that made from calisaya bark. The substance was discovered about 1820, and it has entirely superseded the use of the bark itself in medicine, being most commonly used in the form of sulphate of quinine. The extraordinary value of quinine in medicine in allaying fevers, in curing malaria and as a general tonic has given rise to a large trade in Peruvian bark, and it has caused the cinchona tree to be extensively planted in India and elsewhere. Quinine in small doses is a tonic; in large doses it causes extreme disturbance of the nerves, headache, deafness, blindness and paralysis, and in rare cases, death.

Quin′sy, *quin′zy,* an inflammation of the membranes of the tonsils, often followed by the formation of ulcers which are difficult to heal. The disease usually begins with a chill, which is followed by fever and by severe pain and swelling of the tonsils. Sometimes the pain is intense and the swelling is so great that the jaws can scarcely be moved, and a general fever and even delirium may result, but the disease is rarely fatal. It does not seem to affect either children or old people.

Quintil′ian (about 35–about 97 A. D.), a Roman rhetorician, born in Spain. He went to Rome in his youth and lived there for the rest of his life, with occasional visits to Spain. He practiced as an advocate and was very successful, but his chief fame lay in his extraordinary ability as a teacher of eloquence. His system of rhetoric, a work in twelve books, is remarkably sound in its judgments and broad in its treatment of iterature. Over one hundred fifty declamations exist, which were for long ascribed to Quintilian, but it is believed now that these are for the most part spurious.

Quipo, *ke′po,* a cord about two feet in length, tightly spun from variously colored threads, to which a number of smaller threads were attached in the form of a fringe. It was used among the ancient Peruvians and Mexicans for recording events and keeping records of statistics. The fringe-like threads were also of different colors and were knotted. The colors denoted objects, as white for silver, yellow for gold, etc.; and sometimes they also embodied abstract ideas, as white for peace, red for war. They constituted a rude register of certain important facts or events, as of births, deaths and marriages, the number of the population fit to bear arms or the quantity of stores in the government magazines.

Quir′inal, one of the seven hills of ancient Rome, north of the Palatine. A palace on the Quirinal Hill was begun in 1574. It served formerly as a summer residence for the popes, but since 1870 it has been the residence of the king of Italy.

Quirinal Palace, the royal residence of the king of Italy since 1870, before which time it was used as the summer residence of the popes. It was begun in 1574 by Pope Gregory XIII. It stands on the Quirinal Hill and is decorated with beautiful works of art. The arrangement and decoration are very modern.

Quiri′nus, among the Romans, a surname of Romulus after he had been raised to the rank of a divinity. Hence the name *Quirinalia* was given to the festival in honor of Romulus, held annually on the 13th day before the Calends of March, that is, the 17th of February.

Quirites, *kwir i′teez,* a designation of the citizens of ancient Rome in the civil capacity. The name of Quirites belonged to them in addition to that of Romani, the latter designation applying to them in their political and military capacity.

Quit′claim. See Deed.

Quito, *ke′to,* the capital of Ecuador, is situated a little to the south of the equator, in a ravine on the east side of the volcano of Pichincha, 9348 feet above the sea. Its streets, with the exception of four, which meet in the large central square, are narrow, uneven, badly paved and extremely dirty. The more important public buildings are the cathedral, several other churches and convents, the townhouse, the courthouse, the president's palace, the university, the episcopal palace, an orphan asylum and a hospital. The manufactures consist chiefly of woolen and cotton goods, saddles, shoes and carpets. The lack of good roads and railways has prevented the growth of any considerable trade. Quito was originally the capital of a native kingdom of the same name, but the modern town was founded by the Spaniards in 1534. It has repeatedly suffered from earthquakes. Population, about 80,000, largely half breeds and indians.

Quoits, a game played with flattish rings of iron, generally from 8¼ to 9½ inches in external diameter, the rim being 1 or 2 inches in breadth. The quoits are convex on the upper side and slightly concave on the under side, so that the outer edge curves downward and is sharp enough to cut into soft ground. Two pins, called *hobs,* are driven into the ground from 18 to 24 yards apart, and the players, who are divided into two sides, stand beside one hob. In regular succession they throw their quoits (of which each player has two) as near the other hob as they can. In throwing the quoit an upward and forward pitch is given it with the hand and arm; this imparts to it a whirling motion, which makes it cut into the ground. The two quoits nearest the hob count each a point toward the game; if a quoit leans against the hob it counts 3 and if it encircles the hob it counts 5 points. The game is often played with common horseshoes.

Quo′rum, the term applied to the number of members of an assembly required to be present at the transaction of business. This number varies and is usually fixed by the constitution, bylaws or charter of the organization; however, it may be determined by the assembly itself. A quorum is usually a majority of the regular members. In the British Parliament, however, in which the matter is determined by each house for itself, a quorum in the House of Commons is 40 members, and in the House of Lords, 3 members. The United States Constitution fixes the quorum of each of the houses of Congress at a majority of all the members. It was the former practice in the House of Representatives not to count the members who were present and did not vote on a question, in the determination of a quorum, but during the speakership of Thomas B. Reed, all members present were counted, and this is now the regular rule, though not a written one.

Quo Warran′to. See Writ.

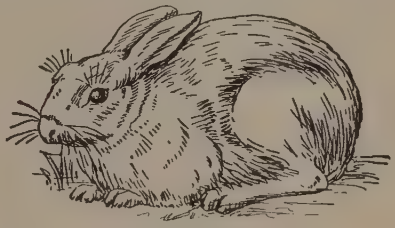
R

R, the eighteenth letter of the English alphabet. In Phoenician and in early Greek it resembled a *P*, and the extra line was added in Latin, after the *P* assumed its present form. In the pronunciation of English words it represents two somewhat different sounds. The one is heard at the beginning of words and syllables and when it is preceded by a consonant; the other, less decidedly consonantal, is heard at the end of words and syllables and when it is followed by a consonant. In the pronunciation of many English speakers, *r*, followed by a consonant at the end of a syllable, is scarcely heard as a separate sound, having merely the effect of lengthening the preceding vowel.

Rabat, *ra baht′*, a maritime town in Morocco, on the Atlantic, at the mouth of the Bu-Regreg. It is surrounded with a wall, flanked by numerous towers, and has a citadel and batteries. It has manufactures of carpets, woolens, cottons, pottery and leather and considerable trade in wool and corn. On the other side of the river mouth is the town of Sallee. Population, about 35,000.

Rab′bi, a title of honor among the Hebrews, corresponding nearly to the English *master*. There are two other forms of the title, *rabboni* and *rabbani*, the former of which is found in the New Testament. It is supposed that this title first came into use at the period immediately preceding the birth of Christ, and in the time of our Lord was applied generally to all religious teachers, sometimes to Christ himself. The term rabbi, or rabbin, is now applied to regularly appointed teachers of Talmudic Judaism.

Rab′bit, a genus of gnawing rodent animals, included in the same family with the hares. The rabbit is smaller than the hare and has shorter ears and shorter hind legs. Its coarse fur in its native state is of a nearly uniform brown color, but under domestication the texture changes and the color may become pure white or pure black, piebald, gray or other hue. Rabbits are natives of all temperate climates, and in the wild state they congregate in sandy pastures and on hill slopes. They breed several times a year, beginning at the age of six months, and produce from five to seven or eight at a birth. They are so prolific that they may easily become a pest, as in Australia, if not kept in check. They feed on tender grass and herbage and sometimes do great damage to young trees by stripping them of their bark. Rabbits make affectionate pets, and sometimes exhibit considerable intelligence. The skin of the rabbit, cleared of hair, is used with other skins to make glue and size. The fur is employed in the manufacture of hats and to imitate other and more valuable furs.



RABBIT

Rabelais, *ra b′lai′*, François (about 1490–about 1553), a humorous and satirical French writer. He was at first a monk, but his desire for broad learning, beyond the bounds which his order permitted, brought him into disfavor, and he left the monastery for Montpellier, where he studied medicine and later practiced as a physician. In 1532 he went to Lyons as hospital physician, and two years later he accompanied Jean du Bellay on an embassy to Rome. On his return to France, he went first to Paris; but not long after he was once more at Lyons. In 1536 Rabelais was again at Rome, and on this occasion he obtained from the pope absolution for the violation of his monastic vows and permission to practice medicine and to hold benefices. Probably he was in Paris in 1546, but during most of 1546 and part of 1547 he was physician to the town of Metz. About 1550 Rabelais was appointed to the curacy of Mendon, but he resigned the position and died in 1553, according to most authorities. His great work is the *Gargantua and Pantagruel*, a satirical romance dealing with the corrupt society of the time. By many Rabelais has been set down as a gross buffoon, and there is much in his writings to justify the harsh judgment, though he probably did or said little that was repulsive to the taste of his times. As regards the purpose of his work, many have looked upon Rabelais as a serious reformer of abuses, religious, moral and social, assuming an extravagant masquerade for the purpose of protecting himself from the possible consequences of his assaults on established institutions.

Raccoon' or **Coon,** an American flesh-eating mammal, closely related to the bear. The common raccoon is about the size of a cat, and its grayish-brown fur is deemed valuable, being principally used in the manufacture of hats. This animal lodges in hollow trees and feeds occasionally on vegetables, but usually on fish and small water animals. It inhabits North America from Canada to the tropics. The *agouara*, or *crab-eating raccoon*, is found on the American continent farther south than the above species and is generally larger. There is also a Himalayan species, called the *punda*.

RACCOON

Race, a term used to denote any swift course, applied, especially, to a contest of speed in running, walking, riding, driving, sailing, rowing, swimming or any other mode of progression.

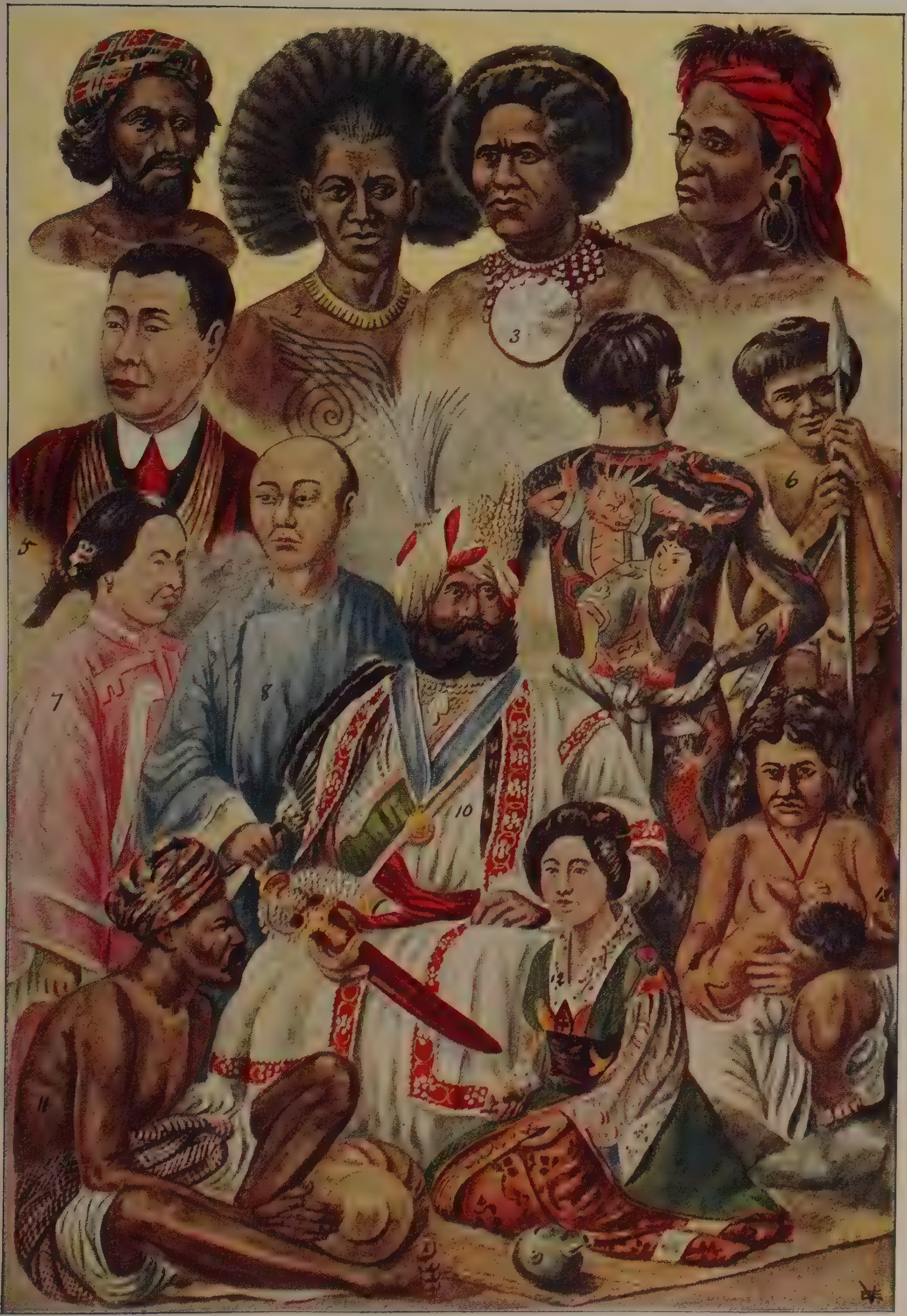
In athletics, running races for distances varying from 50 yards to 25 miles, are now among the regular events, and furnish, perhaps, the most interesting contests (See ATHLETICS). During the period when bicycles were in great vogue, bicycle races were also common at such meets, as well as at fairs and special race meetings. Automobile and motorcycle races have recently taken a prominent place among sports, though less popular, because more expensive. Intercollegiate rowing races have long attracted wide attention in both England and America and are not only interesting for the skill displayed by the participants, but are spectacular and thrilling for the spectators. International rowing races have recently been arranged and have proved both interesting and profitable. The international yacht races between representatives of England and America have been conducted at frequent intervals for nearly fifty years and have invariably aroused the greatest enthusiasm.

Doubtless the most universally enjoyed of all racing sports are the horse races, which furnish the principal amusement features at the autumn fairs in all parts of the country and at many special racing meets in the larger cities of both England and America. The length of the course at these races varies from one-half a mile to two miles, and several "heats" are run in each race, the horse which ranks best in all or in a majority of the heats or shows its superiority according to a prearranged standard being declared the winner.

The race horse has been developed by careful breeding and training, through sacrificing all qualities to that of high speed for comparatively short distances. Such horses are classed according to the character of their stride, as trotters, pacers or runners. Usually, separate races are provided for each class, and often restrictions are made as to age, sex, speed or other special characteristics. The fastest time made up to 1906 by a trotting horse in a race was made by Cresceus in 1901; it was a mile in 2 minutes 3¼ seconds. Lou Dillon several times trotted a mile behind a running horse and a wind shield in 1:58½. The pacing record in a race was set by Star Pointer in 1897 at 2:00½, although Dan Patch, in 1905, in an exhibition heat, covered a mile in 1:55¼. The running record is the fastest of all; it is 1:37⅖ for a mile, and was made by Dick Welles in 1903 and by Kiamesha in 1905.

The famous English Derby has been held at Epsom, England, near London, almost every summer since 1780. It is witnessed by sportsmen from all parts of the world and is made a fashionable society event. The same is true of the so-called Derby races in different parts of America, as at Brighton Beach, L. I., and Chicago, Ill. The latter has been discontinued.

Races of Men. It is a difficult matter to classify mankind, for there is scarcely any one



MONGOLIAN TYPES

1, Persian.
2 and 3, Fijians.
4, Dyak (Borneo).
5, Japanese.
6, Native of the Philippines (Bottokleu).
7 and 8, Chinese.
9, Tattooed Japanese.
10, Kashmir Ruler.
11, Singhalese.
12, Japanese Woman.
13, Philippine Negrito.

characteristic belonging exclusively to a single race, though climate and other influences have modified the structure of certain races to such an extent that they are easily recognized as differing from other races in distant localities. Scientists have offered many classifications, but none has yet appeared to be altogether satisfactory. The one most generally known is that made by Blumenbach, near the beginning of the nineteenth century. The chief basis of his classification was the color of the skin, the shape and size of the head and peculiarities of the features. Blumenbach recognized five distinct races, namely, the Caucasian race, the Mongolian race, the Malay race, the Negro race and the American, or Red, race.

CAUCASIAN RACE. This term was first used by Blumenbach, who believed this to be the original race from which the others were derived. He gave it the epithet of Caucasian because he believed that in its highest physical perfection it was to be met with among the mountaineers of the Caucasus. In later classifications this race is usually divided into Aryan, or Indo-European, and Semitic. The Caucasian race controls all of Europe, Africa north of the Sudan, southern and western Asia, America and Australia. In color Caucasians are white, or light, and have straight or wavy hair and variable skull and features. Yet the diversities in the race are numerous, and very many types may be found between the light-haired, blue-eyed inhabitants of Scandinavia and the almost black tribes of the Great Desert. The Caucasian race has given to the world the three religions that teach there is but one God, namely, the Christian, which follows the Bible; the Jewish, which rejects the New Testament, and the Mohammedan, which has for its sacred book the Koran.

Two branches of this race are recognized, the South Mediterranean and the North Mediterranean. The former branch is composed of two stocks, the Hamitic, of which the Libyans and Egyptians are types, and the Semitic, of which the Arabs, Abyssinians and Hebrews are types. In the North Mediterranean branch the Basques are considered a stock by themselves, as are also the peoples of the Caucasus. The great stock of this branch, however, is the Aryan, and in this the peoples are grouped under different heads, of which the leading are the Teutonic, including the Germans, English and Scandinavians; the Slavonic, including the Russians, Poles, Czechs and Bulgarians; the Indo-Iranic, including the Persians and Hindus; the Hellenic, including the Greeks and Latins, and the Celtic, of which the Highland Scotch and the Irish are types. Articles treating of the several peoples will be found in their proper places in the text.

MONGOLIAN, OR YELLOW, RACE. The Mongolians have flat faces, short skulls, coarse hair, yellowish skin and small, black eyes, slanted downward toward the nose; they are usually under the average height. The Chinese, who include one-fourth of the people of the world, are the largest nation, but the Japanese have proved themselves by far the most progressive of the Mongolians. Many of the interior tribes of Asia are still densely ignorant and seem to have little capacity for acquiring knowledge. The Mongolian race is distributed over the greater part of Asia and the islands of the Northern Pacific. The more recent writers consider the Eskimo as Mongolian. Consult the color plate, *Mongolian Race*, accompanying this article; also the articles on leading peoples in their proper alphabetical positions in this work.

MALAY, OR BROWN, RACE. This race inhabits the Malay Peninsula and the Asiatic Archipelago. In physical appearance, Malay peoples are under middle height; they are light brown in color and have black, straight hair, high cheek bones, black and slightly oblique eyes and little or no beard. Most of them are strong, fierce savages, treacherous and deceitful in disposition and bitterly opposed to encroachments from the civilized peoples. Many writers do not follow Blumenbach in making of the Malays a distinct human race, thinking them to be merely a variety of the Mongolian race.

NEGRO, OR BLACK, RACE. This branch of the human family is composed of those people who have a brownish or black complexion, broad, flat nose, thick lips, woolly hair and long skulls. The true negroes are found in the Sudan, while south of them are the Bantu group, as well as the dwarfish Bushmen, the Hottentots and the dwarfs of the Kongo. The latter are called negroids and differ widely in languages and customs from the typical negroes. The black natives of Australia and Papua are sometimes classified as negroids and separated from the Malay race. As a rule, negroes differ from the whites as much in mental characteristics as in physical ones, though there are individual exceptions. The negroes are of a superstitious temperament, believing in witches, charms and evil spirits. In general, they are lively, excitable, passionate and fond of music and display. Unless taught by other races, no negro tribe has ever developed a civilization.

Consult the accompanying color plate, *Negro Race;* also the articles on the chief negro tribes.

At one time negroes were taken in large numbers from Africa, transported to other countries and sold as slaves. In consequence there are many negroes now living in the United States, in Europe and in other parts of the world. In the United States many of the negroes have, since their liberation as a result of the War of the Rebellion, acquired good educations and hold responsible positions (See NEGRO, EDUCATION OF THE).

AMERICAN, OR RED, RACE. See INDIANS, AMERICAN.

Rachel, *ra shel'*, MADEMOISELLE (1821–1858), a French tragic actress of Jewish parentage, whose real name was Elizabeth Rachel-Felix. For a time she gained her living by singing in the streets of Lyons, but her voice attracted attention, and she was enabled to receive a course of instruction at the conservatory. In 1837 she made her début in Paris, but attained no special success until the following year, when she took the Parisian public by storm by the admirable manner in which she presented the plays of Racine and Corneille. Her renown continued to increase, and for many years she reigned supreme at the Théâter Français, making also tours to the provincial towns of France and to Belgium. Later she visited America. Rachel's greatest success was in the title rôle of Racine's *Phèdre,* and it is doubtful whether her work in that part will ever be excelled on any stage.

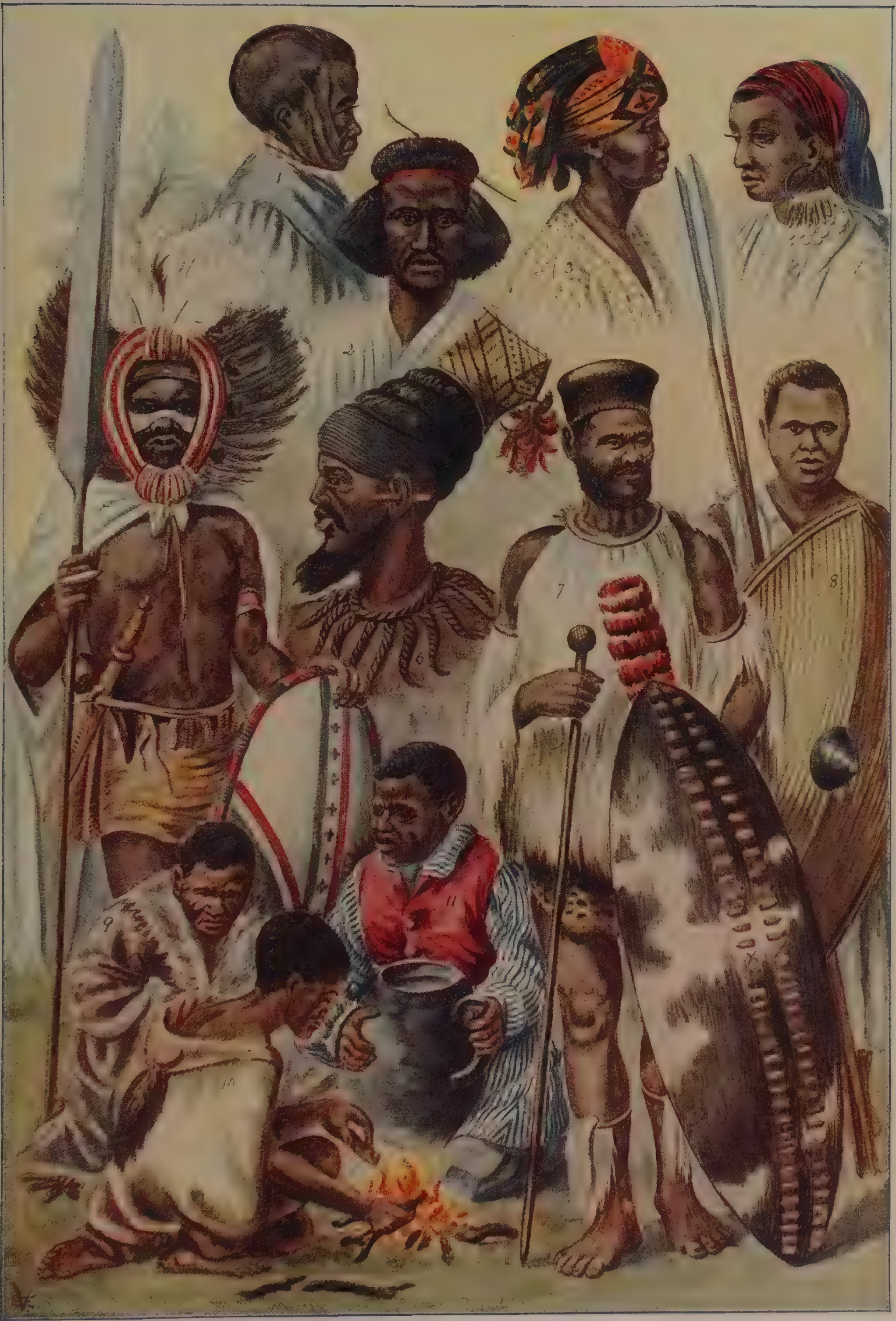
Racine, *ra seen',* WIS., the county-seat of Racine co., 23 mi. s. of Milwaukee, on Lake Michigan, at the head of the Root River, and on the Chicago & Northwestern and the Chicago, Milwaukee & Saint Paul railroads. The city is regularly laid out, on an elevation of about 40 feet above the lake. It has a good harbor and conducts a large trade in farm products and manufactured goods. Racine is an important manufacturing center, producing agricultural implements, wagons, flour, boots, shoes, trunks, valises and various foundry, machine shop and lumber mill products. It contains the Saint Luke's Hospital, Taylor Orphan Asylum, Racine College, Saint Catherine's Academy, a public library, and college and Y. M. C. A. libraries. It was settled in 1834 and was chartered as a city in 1848. Population in 1905, 32,290.

Racine, JEAN (1629–1699), a great French tragic poet. His earliest play, *La Thébaïde,* dealing with the struggle between Polynices and Eteocles, was performed by Molière's troupe at the Palais Royal in 1664, as was also his next, *Alexander the Great.* The first of his great plays was *Andromaque,* which on its performance at the Hôtel de Bourgogne, in 1667, produced a profound impression. Within ten years after the appearance of *Andromaque,* Racine produced *Britannicus, Berenice, Bajazet, Mithridates, Iphigenie* and *Phèdre.* In 1673 he obtained a seat in the French Academy. His withdrawal from the theater in 1677 was due partly to chagrin at the success of a hostile party of theatrical critics, who applauded a rival, and partly, perhaps, to religious motives. At this period his friends persuaded him to marry, and soon after he was appointed, along with Boileau, historiographer to the king, whom he accompanied in his campaign to Flanders. The only dramatic works he produced after 1677 were *Esther* and *Athalie.* The latter, at least, is ranked among Racine's greatest works.

Rack, an instrument for the judicial torture of criminals and suspected persons. It was a large, open, wooden frame, within which the prisoner was laid on his back upon the floor, with his wrists and ankles attached by cords to two rollers, one at each end of the frame. These rollers were moved in opposite directions by levers till the body rose to a level with the frame; questions were then put, and if the answers were not deemed satisfactory, the sufferer was gradually stretched till the bones started from their sockets. It was formerly much used by civil authorities, in the cases of traitors and conspirators, and by the members of the Inquisition, for extorting a recantation of heretical opinions.

Rad'cliffe, ANN WARD (1764–1823), an English novelist, born in London. She was married at the age of twenty-three to William Radcliffe, afterward editor and proprietor of the *English Chronicle* newspaper. She published in quick succession *The Castles of Athlin and Dunbayne,* a Highland story; *A Sicilian Romance*; *The Italian*; *The Romance of the Forest,* and *The Mysteries of Udolpho,* which was long very popular.

Radcliffe College, an educational institution for women, founded at Cambridge, Mass., in 1879, by the Society for the Collegiate Instruction of Women. It was at first known as the Harvard Annex, though it had no official relations with Harvard University until 1894, when by act of the General Court of Massachusetts its name was changed to Radcliffe College, in honor of Ann Radcliffe, the first woman to give a money endowment to Harvard. The require-



NEGRO TYPES

1, Koto from the Niger.
2, Nubian.
3, Hottentot.
4. Abyssinian.
5, Masai.
6, Monbuttu.
7, Zulu.
8, Uganda.
9 and 10, Bushmen
11. Namaqua.

ments for admission and for degrees are identical with those of Harvard College, and the courses of instruction, which in the main are duplicates of those in Harvard College, are given for the most part by members of the Harvard University faculties. The attendance is about 500.

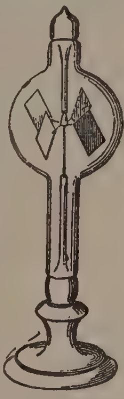
Radia'ta, the name of Cuvier's fourth division of the animal kingdom, intended to include those animals whose parts are arranged around an axis, more or less in the form of rays. This division is no longer recognized, as the Radiata have been divided into Protozoa and Coelenterata.

Ra'dia'tion. See HEAT, subhead *How Heat Travels.*

Rad'icals. See LIBERAL.

Radiolaria, a family of protozoans, which produce a flinty shell or small, hard projections and whose pseudopodia, or extensions of protoplasm, stand out in the form of a star. See PROTOZOA.

Ra'diom'eter, an instrument used for detecting the radiation of heat. The most common radiometer consists of four aluminum disks, arranged at right angles to each other and attached to a vertical axis, upon which they revolve. This apparatus is enclosed in a bulb-shaped tube, from which the air has been practically all exhausted. One side of the aluminum disk is coated with lampblack, while the other side is bright. The dark side of the disk receives the heat rays and radiates them The reaction of this radiation causes the disks to revolve. This instrument is very sensitive. Lighting a match near one or even bringing the hand close to it will cause the disks to revolve rapidly.



RADIOMETER

Radish, a well-known plant of the mustard family, cultivated for its edible roots, but unknown in a wild state. It is a native of Asia, but now flourishes in all temperate regions. It grows to about three feet in height and bears nearly white flowers, on a branched stalk. Some species are annual, and some are perennial. The roots of some varieties are globular in form, those of other species are elongated, and in certain species the roots are white, while in others they are red. The seeds are sown in rows about a half-inch apart, and they mature in from three to five weeks. Often three or more crops may be raised in a season.

Ra'dium, a metal which possesses the property of emitting rays of light, heat and chemical action. It was discovered by Professor Curie and his wife, Madame Curie, at the Industrial School of Physics and Chemistry in Paris. In 1896 it was found that uranium and all its compounds continually emit radiations and have a penetrating power similar to that of the X-rays. Professor and Madame Curie followed this discovery with a series of experiments on the ore of uranium, commonly known as pitchblend, and they obtained a pure radium chloride in 1902.

Radium emits light and heat without apparent loss of weight or strength, and it maintains a constant temperature of at least 2° above that of the surrounding atmosphere. Its rays are likely to produce sores, which are difficult to heal, but in a mild form these rays have a curative effect upon lupus. The properties of radium are not well understood. It is obtained separately only in small quantities, but it is now believed that radium, or at least similar radioactive matter, exists in almost all substances, though in exceedingly small quantities. A variety of theories has been offered to explain its peculiar properties. Some learned investigators have even declared that radium is a source of much, or at least a part, of the earth's heat, and that it is probably of the same substance as the sun, since it is known to emit certain gases of the same nature as those given off by the sun. Much of the speculation concerning radium, its properties and usefulness, have been found to be unwarranted by actual demonstration, but that it wil prove of considerable value to man is conceded by all scientists.

RADISHES

Raff, *rahf,* JOACHIM (1822–1882), a musical composer, born in Switzerland, of German parents. He was encouraged by Mendelssohn and Liszt, and his opera *König Alfred* was first performed at Weimar, at the Court Theater, under Liszt's direction. His reputation rests chiefly on his symphonies, especially *Im Walde* and *Lenore.*

Raf′fia, a strong fiber obtained from the Jupati palm of South America. It is used largely in the United States, especially in nurseries and greenhouses, for tying up plants. It is also woven into matting for decorative purposes. In the schools of the United States, raffia weaving has become an important branch of kindergarten work. The fiber is woven by the natives of South America into cloths, from which almost all their clothing is made.

Rafflesia, *raf fle′zhe a,* a genus of parasitic plants found in the Philippine Islands, Sumatra and the Malay Archipelago. The flower is the only visible part of the plant and first appears as a swelling on the bark of the root. As it grows, it breaks through the bark and rises in the form of a cabbage head. This grows to a very large size, sometimes measuring as much as three feet in diameter and sometimes weighing fifteen pounds.

Rag′lan, Fitzroy James Henry Somerset, Lord, first baron (1788–1855), English field-marshal. He entered the army in 1804 and served on Sir Arthur Wellesley's staff in the expedition to Copenhagen. He acted as military secretary to the latter during the Peninsular War, in which he greatly distinguished himself at the capture of Badajoz. In Wellington's campaign of 1815 he took a prominent part, and lost his right arm at Waterloo. From 1815 to 1818 he acted as secretary to the embassy at Paris, and from 1819 to 1852 he was military secretary to the Duke of Wellington. In 1852 he was made master general of the ordnance and was elevated to the House of Lords as Baron Raglan. On the breaking out of the Crimean War, he was appointed commander of the forces.

Ragnarok, *rahg na rök′,* literally *judgment of the gods,* but usually taken as meaning *twilight of the gods,* a time which the northern people believed must come, when the great gods should come into mortal conflict with the powers of evil and should be overthrown; when the dwellings of the gods should be destroyed and all earth should be desolated. It was believed, however, that although the most of the great gods were to be killed by the powers of evil which would be let loose when Ragnarök came, a new generation of gods would arise who were to rule over a new and purer heaven and earth.

Rags, though valueless for most purposes, are yet of great importance in the arts, particularly in paper making. Besides the rags collected in the United States, others are imported in large quantities from various foreign countries. Woolen rags of a loose texture, and not too much worn, are raveled by means of machinery and mixed up with good wool, to form what is known as *shoddy,* from which cheap woolen goods are made. See Shoddy.

Rag′weed, an annual weed, common in rich, damp soils. It is found in Europe and receives its name from the ragged appearance of its leaves. The flowers are small and golden yellow in color. The *great ragweed* is a species confined to southern, central and eastern states. Its flowers grow in great clusters and are commonly found by the side of roads and in pastures. Other names often applied to this weed are *bitterweed, hogweed* and *Roman wormwood.*

Rahway, *raw′way,* N. J., a city in Union co., 20 mi. s. w. of New York City, on the Rahway River and the Pennsylvania railroad. It is a fine residence place and has parks and a public library. It contains a large printing house and manufactories of steel castings, chemicals, felt goods, music boxes, electrical supplies and other articles. There is also a large trade in fruit and vegetables. Population in 1905, 8649.

Raibolini, *ri bo le′ne,* Francesco di Marco di Giacomo. See Francia.

Raikes, *rayks,* Robert (1735–1811), an English publisher and philanthropist. He was proprietor of the *Gloucester Journal,* which he used in effecting reforms. He is chiefly remembered because he originated the Sunday-School, by gathering together a number of street children for secular and religious training.

Rail, the general name for a number of birds which have long bills, often more or less curved at the tip and compressed at the sides, short tails and comparatively short legs. Most of the members of this family frequent the marshes, though a few species are found on dry soil. Besides the rails proper, the coots, water hens and crakes are members of the family. Though some of them

RAIL

are very good swimmers and divers, all are rather poor upon the wing. Several are much hunted because of their delicate flesh. In the United States, the *clapper rail*, the *king rail* and the *Virginia rail* are the most common representatives of the true rails. For the egg of the last, see BIRDS, *color plate*. See also COOT; CORN CRAKE.

Railroad or **Railway**, a road having parallel lines of iron or steel rails fastened to a roadbed, for the passage of wheeled vehicles constructed to fit the road. Railroads were known in the days of the Romans, and the tracks consisted of two lines of dressed stone, laid end to end, so as to provide a continuous stone way. The first attempt at the construction of railways like those in use at the present time was made in England as early as 1602. These were made of wooden rails, or beams, laid down for the wheels of wagons used to carry coal from the mines (See TRAMWAY). Later flat strips of iron were nailed to the wooden rails, to protect them from wearing, and in 1767 cast iron rails were introduced. Two years later flat cast iron rails, with an upright flange, to confine the wheels to the track, were invented. In the latter part of the eighteenth century, wrought iron bars, laid on wooden ties, were substituted for the old cast iron rails, and shortly after 1820 the rolled rail, similar to that now in use, was invented. The modern railroad dates from the construction of the Liverpool & Manchester railway, which was completed in 1829. It was upon this line that steam as a motive power was first successfully introduced. See LOCOMOTIVE.

RAILROADS IN THE UNITED STATES. The first railway in the United States was built from the granite quarries in Quincy, Mass., to the coast, and it was designed for conveying stone for the Bunker Hill Monument. This line was completed in 1826, and the cars were hauled by horses. The following year the Delaware & Hudson Canal Company began building a road from Honesdale, Pa., to their coal mines at Carbondale, a distance of sixteen miles. This line was completed and opened for business the same year that the Liverpool & Manchester railway was completed. Horses and stationary engines were used to haul the cars. It was upon this road that the first locomotive used in the United States was placed in service. This locomotive was the *Stourbridge Lion* and was imported from England.

The first railroad built in the United States for the purpose of carrying both passengers and freight was the Baltimore & Ohio. Construction upon this line began in 1828, and by May, 1830, the first division, extending from Baltimore to Ellicott's Mill, was opened to traffic. For two years horses were employed to haul cars, but after that locomotives were used. The South Carolina road, begun in 1830, was the first line to employ steam as a motive power from the beginning. Following these pioneer lines, numerous others were constructed within the next twenty years. Between 1830 and 1835 about 800 miles of railroad were built in the United States, this being about one-half of the mileage of the world, and from 1835 to the beginning of the Civil War, railroad construction was active throughout the country. In 1842 the New York Central was completed as far as Albany, and the same year the Boston & Albany was completed. Through rail communication between Cincinnati and Lake Erie was established in 1848, and that same year the Pennsylvania Railroad, the beginning of the great Pennsylvania system, was chartered. In 1852 the Michigan Central and the Michigan Southern lines were opened, and the following year the connecting link between Cleveland and Toledo was completed, thus securing through rail communication from the seaboard to Chicago. The Chicago & Rock Island was completed between Chicago and the Mississippi River in 1854, and in the year following, the Chicago & Galena, the beginning of the North-Western system; the Chicago & Alton; the Chicago, Burlington & Quincy, and the Illinois Central were also opened to traffic. In 1855, also, Cincinnati and Saint Louis were connected by the Ohio & Mississippi railroad. In 1858 the Hannibal & Saint Joseph road reached the Missouri River. This was the first road extending beyond the Mississippi.

At the beginning of the Civil War there were about 30,000 miles of railroad in the United States, but during the war railroad construction was practically suspended. However, after the close of the conflict the work was taken up with renewed activity, and in 1869 the first transcontinental railroad line was completed, joining the Atlantic and Pacific oceans (See PACIFIC RAILROADS). From that time on railway construction has kept pace with the development of the country, until at the present time there are in the United States about 217,000 miles of railway lines, exclusive of second tracks and sidings, which include about 83,000 more, making in all over 299,000 miles, which is about one-half of the railway mileage of the world.

The following table shows the approximate mileage of the leading countries:

Countries	Miles
Germany	35,000
Austria-Hungary (including Bosnia, etc.)	23,800
Great Britain and Ireland	22,800
France	27,050
Russia (including Finland)	42,519
Italy	10,068
British North America	19,800
Mexico	12,300
Brazil	15,000
Argentina	14,000

CONSTRUCTION. In deciding upon the location of a railroad, attention is given to three conditions—the cost of construction, the cost of operating the line and the traffic that may be secured from the adjoining country. The route over which a line can be constructed with least expense may be more expensive, on account of the cost of operation, than another, over which the cost of construction is greater. In many cases, large cities and towns and good mining, lumbering and farming regions must be reached, even at the expense of extending the line. Hence, it is often found that the route chosen is not the most economical at the time of construction, but becomes so in the course of years.

When the route is decided upon, two surveys are made, the first for determining the curves and grades, and the second for locating the roadbed and indicating the exact grading. For this purpose stakes are set every few rods along the middle line of the roadbed. Each stake is marked with the number of feet and inches to be cut or filled to make the desired grade. As far as possible, the engineer makes the cuts and fills equal, so that the earth from the one can be used in constructing the other. When earth for filling is not immediately available, a trestle is built across the gap and the filling is done after the road is completed.

For a single track the roadbed is from 18 to 22 feet wide, and for a double track it is from 26 to 32 feet wide. When the grading is completed, the cross ties are put in place and the rails are laid. The ties are usually of wood 8 or 9 feet long, 6 to 8 inches thick and hewed on two sides, so as to give a surface 6 or 7 inches wide. They are placed from 18 inches to 2 feet apart, and the rails are fastened to them by long spikes, with heads that act as hooks. When driven close to the rail these spikes hold it firmly in position. Iron plates, called *chairs*, are placed under the ends of the rails, to prevent wearing of the ties, and the rails are joined by plates, called *fish plates*. These are placed one on each side of the web of the rail and are held in position by bolts, which pass through the rail and the plates. A road usually requires about 2500 ties to the mile. The best roads in the United States employ a rail adopted by the American Society of Civil Engineers. As ordinarily made, this rail is 30 feet long and weighs 80 pounds to the yard. It is 7⅜ inches high and has a head 2½ inches wide and 1½ inches deep, a web 5 inches wide and a little over 1½ inches deep and a base 5 inches wide. On roads where high speed is required and on curves, rails weighing 100 pounds to the yard are frequently used.

When first laid, the track is very rough and uneven, and the next process is that of *ballasting*. This consists of spreading evenly over the roadbed a layer of crushed stone, gravel, sand or earth, to a depth of one foot, in which the ties are firmly imbedded. In doing this, each tie is raised or lowered, as may be necessary, to make the track even and smooth. The ballast is packed so tightly around the ties that it renders them immovable. The outer rail on curves is raised to the height necessary for safety, and sidetracks and switches are put in at stations and at such other places as are required.

EQUIPMENT. The equipment of a large railroad system embraces *rolling stock*, the term applied to locomotives and cars; passenger stations; freight depots; shops for building and repairing cars and locomotives; yards for the transfer of freight and the storage of cars; water supply for locomotives; a system of signals for the guidance of trainmen, and telegraph and telephone lines.

The rolling stock consists of locomotives for the passenger and freight service, and the various styles of cars necessary to accommodate traffic. On all lines the passenger service requires baggage, express and mail cars, besides ordinary day coaches. Sleeping cars, dining cars and parlor cars are required on long lines. The first passenger cars in England closely resembled stage coaches, and the first improvement consisted in joining two or more of these into one. Finally, the sides and roof were made continuous; but the cross-partitions, separating the car into compartments, remained, and they still characterize most of the cars in use on English railways. The first passenger cars in the United States closely resembled those of England; but they were soon replaced by the long, box-shaped cars, with an aisle through the middle and a platform at each end, and the best cars now in use are constructed on this plan. A standard passenger car is from 50 to 52 feet long, weighs from 45,000 to 60,000 pounds and is valued at from $4500 to $5500. It is mounted on two six-wheeled trucks and is fitted with a steam or hot-water heating device and with electric or gas lights. A drawing-room car is from 50 to 65 feet long and its value is from $10,000 to $20,000.

The first sleeping car was placed on the Cumberland Valley railroad in Pennsylvania in 1837. In 1859 George M. Pullman changed some day coaches on the Chicago & Alton railroad to sleeping cars, and the experiment was so satisfactory that he felt warranted in building a regular *sleeper.* This car was constructed in the shops of the Chicago & Alton railroad and was christened *The Pioneer.* It was completed in the spring of 1865 and served as the funeral car in bringing the remains of President Lincoln to Chicago. Two years later the Pullman Palace Car Company was organized for the purpose of building and operating a system of Pullman sleeping cars on all railroads in the United States. The Wagner Car Company was also organized at about the same time, and for a series of years these firms divided the business between them. Finally, the Wagner Company was absorbed by the Pullman Company, and now Pullman cars are found on nearly all railroads of the United States and on many of the long lines of Europe. A standard sleeper is from 50 to 70 feet long and costs from $12,000 to $25,000. Less expensive sleepers, known as *tourist cars,* are also operated on most of the transcontinental lines. See PULLMAN, GEORGE M.

Dining cars came into use on the Great Western Railway of Canada in 1867. The first patterns were a combination of dining and sleeping cars, but in 1868 the Chicago & Alton placed a complete dining car in service. The vestibule car was invented by Mr. Pullman in 1887 and is now in use on all first-class trains.

The modern first-class passenger train, such as the *limited* trains on long lines, consists of a baggage car, one or more day coaches, Pullman sleeping cars, a dining car, a library and smoking car combined, and on day trains, a parlor car. The smoking car usually contains a bath room and a barber shop. The train is heated by steam and lighted by electricity, and it is fitted with the most serviceable safety appliances. See AIR BRAKE.

There are many patterns of freight cars, but the common box car is more generally used than all others. The average length of box cars is 34 feet, and their capacity varies from 20 to 30 tons. Steam cars having a capacity of 50 tons are used in handling iron ore and coal. Flat cars are used for lumber and other articles too large to put into box cars, and low open box cars, called *gondolas,* are used for hauling coal. There are also special cars for the transportation of live stock, besides *refrigerator cars,* for the carriage of perishable commodities.

ORGANIZATION. The stockholders of a railroad corporation elect a board of directors and thus concentrate delegated authority on a few men. The board of directors elects a president, generally the executive head of the corporation, one or more vice-presidents, a secretary and a treasurer.

In general, on railroads of the United States, the president is the executive head, and vice-presidents are placed in charge of special departments, but in such positions they are assistants to the president. The general manager of the railroad sometimes is also the president, or he may be one of the vice-presidents; but in general he is not an officer of the directorate, is appointed to the position and may be removed by the president. The general manager has charge of the departments relating to the physical care of the properties of the railroad.

The physical departments of a railroad are each in charge of an official who is held accountable by the general manager for the conduct and maintenance of his particular department. The chief engineer, or superintendent of roadway, has charge of the maintenance of the tracks, the bridges and buildings. Under him is a force of assistant engineers. The roadmaster is in charge of that subdivision of the engineering department which relates to bridges and roadway, and under the roadmaster are supervisors of bridges and supervisors of roads, assigned to each division of the railroad. A supervisor of bridges has charge of bridge gangs, each with its foreman, and composed of carpenters, iron workers, masons and laborers. The supervisor of road has his division divided into sections, each section from 4 to 8 miles in length, and on each section is a section foreman, the head of the section gang, composed of track walker, wood and water tenders and laborers.

The superintendent of machinery, sometimes called superintendent of motive power, has charge of the construction and maintenance of the rolling stock of the railroad—locomotives and cars. His department is divided between a master mechanic, who has charge of locomotives and machine shops, and a master car builder, who has charge of the car shops. The engine men—locomotive engineers and firemen—foremen of machine shops, mechanics and machinists, hostlers and cleaners in the roundhouses and other laborers are under the master mechanic. The master car builder has charge of the shops where cars are built and repaired, and also of the car inspectors, who prevent defective cars from going into trains at central and junction points.

The superintendent of transportation has charge of the movement of trains. He makes all time schedules, and under him are train masters, train dispatchers, telegraph operators, conductors and trainmen.

The car accountant keeps track of all cars belonging to the company, whether on the lines of the owner's railroad or on the lines of foreign roads. He also keeps records of the locations and movements of foreign cars on the railroad. The records are made up from daily reports from freight and passenger conductors and by a system of interchanged reports from car accountants of other roads. He has lost car agents, who travel constantly, searching for and locating missing cars.

The traffic manager has charge of the freight and passenger business, so far as it relates to fixing freight and passenger rates, soliciting business and advertising special trains and excursions. Under him are the general freight and general passenger agents, with their assistants, traveling agents, local agents, rate and division clerks and claim agents.

Each division of the road has its superintendent, who is under the general superintendent, who in turn reports to the general manager. The division superintendent exercises general supervision over everything on his particular division, and to him report the station agents, the yard masters and other employes of his division.

The comptroller is the chief bookkeeper of the railroad, and his department includes the auditor of receipts, auditors of disbursements, traveling auditors, the clerk of statistics, and local treasurers and paymasters, who receive money from the treasurer and disburse it under the direction of the comptroller.

The treasurer makes all payments of dividends and interest under the direction of the president. The purchasing agent buys all material and supplies for the railroad on requisition from heads of departments, and under him are local storekeepers of each division.

The general counsel is at the head of the legal department, and in his department are the attorneys assigned to particular branches of the work.

Many roads have an industrial department, organized for the purpose of locating manufacturing plants on the lines of the road. This department is in charge of the industrial commission.

The land commissioner has charge of the lands of the railroad, secured under land grants from the Federal government and from states, counties and cities.

The surgeon of a railroad sometimes is a physician or surgeon who lives on the line of the railroad, but every important railroad company has its own medical and surgical staff. Some railroads have a system of hospitals, in which sick and injured employes are cared for. The company owns the hospital buildings, and the hospital service is maintained by assessments paid in by the employes of the road. Any deficit is made up by the company.

Railway Signaling. In order to protect passenger and freight trains and to prevent collisions, railroad lines are divided into blocks, the length of a block varying according to the requirements of traffic. On the line, away from terminals, the blocks are long; near terminals they are shorter. Block signaling may be divided into two classes—absolute block and permissive block. Absolute blocking does not allow two trains to be in any part of the same block on the same track at the same time. In permissive blocking, the trains are spaced by time. When one train has passed into a block, another train is not permitted to enter the same block until a certain time has elapsed; generally the time limit is ten minutes for passenger trains and five minutes for freight trains. On some roads the absolute block is used to protect passenger trains and the permissive block is used to protect freight trains.

Movements of trains from one block to another are guided by block signals, which are operated under three systems—telegraph, controlled manual and automatic. In the telegraph system, a tower is placed at the beginning of each block, and in the tower house is the operator. The towers are connected by telegraph. When a train passes out of one block and into the next one, the telegraph operator at that point notifies the operator in the tower in the rear that his block is clear. The operator then throws his signal to *clear* and thus shows the locomotive engineer of the next train that he has permission to proceed. It also is the practice on some roads for the operator to notify the operator of the tower ahead that a train has entered the block.

In this system it is necessary for the operators to be vigilant and accurate, for the success of the system depends entirely upon their faithfulness.

The controlled manual system is an improvement on the telegraph block. It is a telegraph block in itself, but an interlocking system, operated by electricity, prevents the operator in the rear from throwing his signal to clear until the operator in advance has signaled the passage of the train from out of the block.

In the automatic system, the train itself sets or releases the signals by means of electricity. Each block is electrified, through its rails, and at the same time it is insulated from connecting blocks. Each block is also electrically connected by line wire with the block on each side, and in some instances with the second blocks on each side. For instance, suppose three blocks, each a mile long, A, B and C. A train enters block A. At once the semaphore at the beginning of the block comes to the position designating *stop*. This sometimes is called the danger signal. Above this semaphore is another one, and it also rises to the horizontal position, so that both semaphore blades are at the danger position. The train proceeds, and leaves block A for block B. As it does this, it sets both semaphores there at danger, and releases the upper semaphore of block A, so that it drops. This shows that block A is clear, but that the train is in block B. The train, proceeding, leaves block B for block C. At once the two semaphores at block C come to danger; the lower semaphore of block A drops so that both semaphore blades there are *clear* and the upper semaphore at block B drops to clear. This shows that block A is clear with the train not nearer than block C, and that block B is clear with the train in block C, and that block C is *blocked*, because the train is still in it. In this system no train can follow another closer than two blocks.

There are three forms of signals used in the automatic blocking—the semaphore, the revolving banner and the disk. The disk sometimes is called the *banjo* signal, because of its shape. The box has an opening in the front and rear, covered with ordinary uncolored glass. In this box a light is placed. A movable disk, made of red silk, stretched over a light frame, is made to drop in front of the opening, to give the danger signal—the red banner in the day time and the red light at night. An electro-magnet raises the disk, and when the circuit is broken by a train, the disk drops. The banner signal is operated by clock work, but is controlled by electricity. All signals are classed under two heads, home and distant. When the home signal is at its danger position, it means stop; when the distant signal is at its danger position, it means caution. The home signal semaphore has the end of its arm square; the distant signal is a semaphore arm with a notch cut in the end; this is called a fish-tail semaphore. The home signal at night shows a red light for danger and a white light for safety; the distant signal for night shows a green light for caution and a white light for safety, except on those roads where red indicates danger, green clear and a combination of red and green caution. See SEMAPHORE.

When signals and switches are so arranged that their movements are made dependent on each other, the system is called *interlocking*. In the interlocking switch and signal system, all the switches in the group are operated from a tower by the operator of the interlocking machine. The principle of interlocking is that no signal can be shown to indicate that the track is clear until the switches are properly set. That is, the switching is done first, and until that is done and properly done, the operator cannot show the clear signal. All signals in an interlocking system are normally set at danger. The interlocking machine is a system of levers, which are connected, by means of pipe rods and bell cranks, with the switches. The operator in throwing switches to clear a certain route for a train interlocks the levers controlling opposing switches in such a manner that such switches cannot be moved. This is done in the machine itself and prevents the operator from laying out conflicting routes. Switches and signals often are worked at such a distance from the tower that the operator cannot see the signals. In such cases electrical annunciators tell the operator if the contemplated movements of switches have been made.

CONSOLIDATION OF RAILROADS. The first railroads were short lines and were built with little thought of connecting with other lines. This caused numerous annoyances. Freight shipped over different lines had to be reloaded at each terminus, and passengers were required to change cars frequently. Originally no fewer than six separate railroads composed what is now the New York Central, extending from New York City to Buffalo, and this condition characterized most other lines in the country. The first movement toward uniting these roads into a system consisted in making a traffic arrangement, by which the different companies agreed to haul each other's cars over their lines. As the roads extended westward and the movement of freight became more complicated, transportation companies were formed for the purpose of handling through freight. These companies owned their cars and made contracts with the different railroads for hauling. The success of these combinations led the stockholders of connecting lines to unite their roads under a single corporation. Since 1870 most of the long lines east of the Mississippi have been formed in this way. One object of these combinations was to prevent competition and thus to enable the roads to maintain rates; but the Supreme Court of the United States decided that such agreements were in restraint of trade and consequently violated the section of the Interstate Commerce Act forbidding such combinations. Even before this decision, plans were made for consolidating competing lines into systems, so that by 1903 most of the railway mileage was controlled by the following organizations, denoted in most cases by the name of the man or men who hold controlling interests:

	Miles
Vanderbilt system	19,455
Pennsylvania	13,722
Morgan	11,735
Hill-Morgan	20,458
Harriman	18,800
Gould	13,795
Independent systems	35,461

In the belief that this consolidation and other industrial conditions had led to the charging of unfair rates, especially through partiality to certain shippers and certain sections, an agitation was begun for government regulation of railroad traffic. State railroad commissions were organized, but they found it difficult to control traffic within their respective states, without interfering with interstate traffic, which was beyond their province. Consequently, the national Congress enacted a law in 1906, designed to compel railroad companies to abandon the practice of giving rebates to shippers and to abide by one open tariff of "just and reasonable rates."

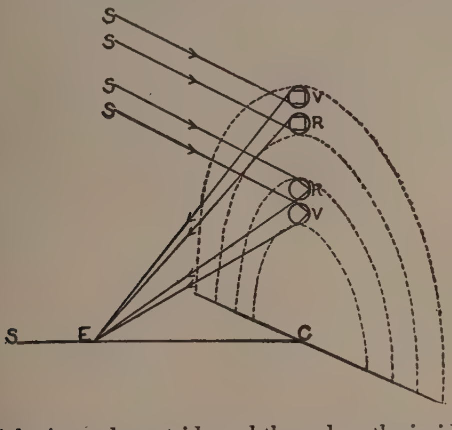
See Interstate Commerce Commission; also Bridge; Tunnel. Consult Johnson's *American Railway Transportation* and Hadley's *Transportation: Its History and Its Laws.*

Rain, water falling from clouds in drops. Rain depends upon the formation and dissolution of clouds. The invisible vapor suspended in the atmosphere, which forms clouds and is deposited in rain, is derived from the evaporation of water, partly from land, but chiefly from the vast expanse of the ocean. At a given temperature the atmosphere is capable of containing no more than a certain quantity of vapor, and when this quantity is present, the air is said to be *saturated* (See Cloud). Air may at any time be brought to a state of saturation by a reduction of its temperature; and if air is cooled below a certain point, the whole of the vapor can no longer be held in suspension, and a part of it is condensed and is deposited in dew or floats about in the form of clouds. If the temperature continues to decrease, the particles of vapor composing the cloud will increase in number and begin to descend by their own weight. The largest of these, falling fastest, will unite with the smaller ones they encounter during their descent, and thus drops of rain will be formed, of a size that depends on the thickness, density and elevation of the cloud. The point to which the temperature of the air must be reduced in order to cause a portion of its vapor to form clouds, or dew, is called the *dew point.*

The average rainfall in a year at any given place depends on a great variety of circumstances, the most important of which are latitude, proximity to the sea, elevation of the region, configuration of the country and exposure to the prevailing winds. When the vapor-laden atmosphere is driven toward mountain ranges, it is forced upward by the latter and is consequently cooled, partly by coming into contact with the cold mountain tops, and partly by the consequent expansion of the air, due to the greater elevation. As the temperature is lowered, the moisture is condensed and falls as rain or snow. The presence or absence of vegetation has also considerable influence on the rainfall of a district. Land devoid of vegetation has its soil intensely heated by the fierce rays of the sun; the air in contact with it also becomes heated and is able to hold more and more moisture, so that the fall of rain is almost impossible. On the other hand, land covered with an abundant vegetation has its soil kept cool and thus assists in condensation. Winds carry water vapor a long distance, and when they blow inland, free from the obstruction of mountains near the coast, as in the valley of the Amazon, they cause rain to fall over extensive regions in the interior of a continent.

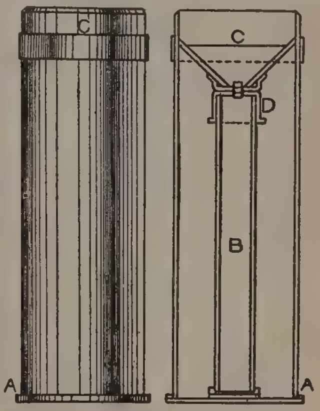
Although more rain falls within the tropics in a year, yet the number of rainy days is less than in temperate climes. Thus, in an average year there are eighty rainy days in the tropics, while in the temperate zones the number of days on which rain falls is about one hundred sixty. At the equator, the average yearly rainfall is estimated at 95 inches. At a few isolated stations the fall is often very great. At Cherrapungee, in the Khasia Hills of Assam, 615 inches of rain fall in the year, and there are several places in India with a fall of from 190 to 280 inches. The rainfall at New York is 43 inches; at Washington, 41 inches; at San Francisco, 22 inches; at Sitka, Alaska, 90 inches. See UNITED STATES, Map, *Annual Rainfall.*

Rain'bow. The rainbow is formed by the refraction of the sun's rays by drops of water; it can be seen only when the sun is shining upon the rain. The rain drops act like a prism and separate the rays into their prismatic colors (See LIGHT, subhead *Spectrum*). Each color is formed by rays that reach the eye at a given angle, and this angle never changes for the same color; hence, the bow appears circular. The observer, *E*, stands upon a line, *SC*, which, if projected, would pass through the center of the circle. The rays, *s s s s*, are reflected and refracted differently in the upper and lower drops. This gives rise to two bows, one within the other, with the colors in them reversed. In the inner and brighter bow, which is called the *primary*, the red is on the outside and the violet on the inside of the arch, and in the outer and dimmer one, the *secondary*, the violet is on the outside and the red on the inside. The difference in brightness and the reverse of colors is caused by the different ways in which the drops reflect and refract the rays of light, as shown in the figure.



Rain Crow. See CUCKOO.

Rain Gauge, *gaje*, an instrument for measuring the depth of rainfall at any one time. The rain gauge in use by the United States Weather Bureau has two cylinders, one within the other. The inner cylinder, *B*, is attached to a funnel-shaped receiver, *C*, whose area is ten times the area of the cylinder. A small opening at *D* allows the water to flow into the outer cylinder, *A*, should the amount of rain more than fill the small cylinder. The instrument is accompanied by a rule, graduated in tenths of inches. A rainfall of one inch will give a depth of ten inches in *B*. Whenever the rainfall more than fills *B*, the water in the small cylinder is measured first and recorded. Then this is poured upon the ground and the water in *A* is poured into *B* and measured. The rainfall is one-tenth the number of inches in the two measures. The rain gauge should be so placed that it will be away from trees, buildings or other high objects, so that the rain falling upon it will be neither more nor less than that falling upon an equal area in any part of the locality.



UNITED STATES RAIN GAUGE

Rainy Lake, a body of water forming part of the boundary between Minnesota and Canada. It is about 50 miles long and is of varying breadth. It receives the waters of numerous small lakes from the east and northeast, and it empties itself by Rainy River, about 100 miles long, into the Lake of the Woods.

Raisin, *ra'z'n*, **River,** MASSACRE OF, a famous massacre, committed during the French and Indian War at Frenchtown (now Monroe), Mich. General Winchester, under orders from General Harrison, took up a position on the Maumee River, and sent a detachment of Kentucky troops to drive the British from Frenchtown. This was successful, and he advanced into the village with his whole force. There he was surprised by a British and indian force of 1500, under Proctor, and he finally surrendered, with assurance of protection from the indians. The able-bodied men were taken to Fort Malden, but the sick and wounded were left in the town. Immediately after the departure of the British and their prisoners for Malden, the indians fell upon those who were left behind, killing nearly four hundred and taking the rest prisoners. The cry, "Remember the River Raisin," was long an inspiration for daring and revengeful feats among the American troops.

Raisins, the dried fruit of various species of vines, comparatively rich in sugar. They are dried by natural or artificial heat. The natural and best method of drying is by cutting the stalks half through when the fruit is ripe, allowing the finest grapes to shrink and dry on the vine by the heat of the sun. Another method consists of plucking the grapes from the stalks, drying them and dipping them in a boiling lye of wood ashes and quicklime, after which they are exposed to the sun upon hurdles of basket work. Those dried by the first method are called raisins of the sun, or *sun-raisins, muscatels* or *blooms*; those by the second, *lexias*. The inferior sorts of grapes are dried in ovens. Raisins are produced in large quantities in southern Europe, in Egypt, in Asia Minor and in California. A kind of raisins without seeds, from Turkey, are called *sultanas*. The *Corinthian raisin*, or currant, is obtained from a small variety of grape peculiar to the Greek islands. See GRAPE.

Rajah or **Râjâ,** *rah'ja,* in India, originally, a title which belonged to those princes of the Hindu race who, either as independent rulers or as feudal vassals, governed a territory; subsequently the title was bestowed by the native governments, and in later times it was given by the British government to Hindus of high rank. It is now not unfrequently assumed by the *zemindars,* or landholders, the title *maharajah* (great rajah) being in our day generally reserved to the more or less powerful native princes.

Rájputana, *rahj poo tah'na,* a division of British India, bounded on the east and southeast by the United Provinces of Agra and Oudh, on the southwest and west by Bombay and on the north by Bahawalpur and the Punjab. It includes the British district of Ajmere-Merwara and twenty autonomous states, each under a separate chief; it has a total area of 127,540 sq. mi. and a population of 9,723,301. Rájputana is intersected by the Aravali Mountains, to the north of which the country is desert. The soil is remarkably saline, containing many salt springs and salt lakes, and much of the well water is brackish. To the south of the range the country is more fertile. The chief industry of the country is agriculture, and cereals and cottons are grown. The water supply is very uncertain, however, and famines are not infrequent. The dominant race, though not the most numerous, is the Rájput. They are the aristocracy of the country; and to a large extent they hold the land, either as receivers of rent or as cultivators. They are essentially a military people, and many of their institutions bear a strong resemblance to the feudal customs which prevailed in Europe in the Middle Ages (See FEUDAL SYSTEM). The entire province is under the suzerainty of Great Britain.

Rájputs, *răj poots'.* See RAJPUTANA.

Rake, a tool used by farmers for collecting hay and grain after mowing and by gardeners for smoothing the ground. The simplest rake has a head and a long, straight handle. The head is a bar of wood or iron, about two feet long, set with teeth, which are three or four inches in length and are placed parallel to each other, two or three inches apart. The handle is attached at the middle of the head and extends crosswise to it. Horse rakes are drawn by a horse, but they are modifications of the simple handrake. They are usually mounted on wheels and are worked by a lever, in the hands of the driver. They are from eight to ten feet long.

Raleigh, *raw'ly,* N. C., the capital of the state and the county-seat of Wake co., 148 mi. n. w. of Wilmington, on the Southern, the Sea Board Air Line and other railroads. The city is situated on an elevation of over 300 feet, in the upper valley of the Neuse River. The state capitol is a granite structure and occupies a prominent site on Union Square, near the center of the city. Other places of interest are the Confederate and National cemeteries, Pullen Park and the large state agricultural experiment farm. The educational institutions include the state college of agricultural and mechanic arts, Baptist University for Women, Peace Institute, Saint Mary's School, Saint Augustine Normal School and Collegiate Institute, and Shaw University. There are large state and supreme court libraries and the Raney Public Library. Some of the charitable institutions are the state asylum for the insane, the state institutions for the deaf, dumb and blind and two orphanages. Other prominent buildings are the governor's mansion, the state penitentiary, the supreme court building, the state geological museum, the Federal building, the old Yarborough and the Park hotels, the Tucker and other business blocks.

The city has an extensive trade in cotton, tobacco and general produce and contains a large spinning mill, gingham and other cotton goods factories, underwear and hosiery works, oil mills, phosphate works, cigar factories, car works and various other industrial establishments. The site of the city was chosen for the capital in 1792, was laid out the same year and was named in honor of Sir Walter Raleigh. The legislature first met here in 1794. The city was occupied by Sherman's army during a part of 1865. Population in 1900, 13,643. The suburbs adjoining the corporate limits are estimated to form a total business and social community of 20,000 people. Consult Battle's *The Early History of Raleigh.*

Raleigh or **Ralegh**, Walter, Sir (about 1552–1618), an English navigator, warrior, statesman and writer, born in Devonshire. He studied at Oxford, and at the age of seventeen he joined a body of gentlemen volunteers, raised to assist the French Protestants. Little is known of his adventures for some years, but in 1580 he distinguished himself in the Irish rebellion. He now became a favorite at court; according to tradition, this was because he threw his embroidered cloak into the mud, in order that the queen might pass. In 1584 he obtained a charter of colonization and made repeated unsuccessful attempts to colonize Virginia. In 1584, also, he obtained a large share of the forfeited Irish estates and introduced there the cultivation of the potato. In 1588 he rendered excellent service against the Spanish Armada, and subsequently vessels were fitted out by him to attack the Spaniards.

SIR WALTER RALEIGH

To discover the fabled El Dorado, or region of gold, Raleigh planned an expedition to Guiana, in which he embarked in 1595. He reached the Orinoco, but was obliged to return after having done little more than take formal possession of the country in the name of Elizabeth. In 1596 he held a naval command against Spain, under Lord Howard and the earl of Essex, and he assisted in the defeat of the Spanish fleet and the capture of Cadiz.

James I, on his accession in 1603, had his mind poisoned against Raleigh, whom he deprived of all his offices. Accused of complicity in Lord Cobham's treason against James, Raleigh was brought to trial in November, 1603, found guilty and sentenced to death. He was, however, reprieved and confined to the Tower. Here he remained for twelve years, devoting himself to scientific and literary work. In 1616 he obtained his release by offering to open a mine of gold which he believed to exist near the Orinoco. The enterprise proved disastrous. Raleigh's force had attacked the Spaniards, and on his return James, to favor the Spanish court, determined to execute him on his former sentence. After a trial before a commission of the privy council, he was put to death. As a politician and public character Raleigh was unscrupulous, like the age in which he lived, but in the capacity and vigor of his mind, he had few equals, even in an age of great men.

Ramayana, *ra mah'ya na,* a great epic poem of India, written largely by Valmiki. It is one of the great epics of the world. The event with which it chiefly deals is the capture by Rama, king of Oudh, of a kingdom called Lanka, which is probably Ceylon.

Ramee, *ra may'*, Louise de la (1840–1908), an English novelist, better known by her pen name, *Ouida.* She was the author of many popular novels of a melodramatic character, and of numerous stories for children. Among the latter *A Dog of Flanders* and *Two Little Wooden Shoes* are well known.

Rameses II, *ram'e seez,* (about 1340–1273 B. C.), the greatest of the twelve Egyptian kings of that name, identified with the Sesostris of Greek writers. He was the third king of the famous nineteenth dynasty and was a powerful ruler, a great builder and a successful warrior. His first achievement was the subjection of Ethiopia, and one of his greatest expeditions was that in which he defeated a confederacy of which the Hittites were the head. At Tanis, his chief residence city, he built a granite temple, which contained a colossal statue of himself, and he left many other monuments and temples. Until recently it was believed that it was for his buildings that the Israelites were compelled to make "bricks without straw," but modern research has revealed the fact that the exodus from Egypt took place before his time. The mummy of Rameses II was discovered some years ago at Thebes.

Ram'esse'um, a temple built by Rameses II, on the west bank of the Nile at ancient Thebes, and dedicated to Ammon. It is now in ruins, but enough remains of it to show its grandeur.

Rameswaram, *rah mes'wa rum'*, a low, sandy island in the Gulf of Manar, between the mainland of India and Ceylon. It is about 11 miles long and 6 miles broad, and it contains one of the most venerated Hindu temples in India, the resort of thousands of pilgrims. Population, 17,854.

Ramie, *ram'e.* See BOEHMERIA.

Ramsay, *ram'zy,* DAVID (1749–1815), an American physician and historian, born in Pennsylvania. He served as surgeon during the Revolutionary War, was a delegate to the Continental Congress from 1782 to 1786 and a member of the South Carolina legislature for many years. He was shot by a lunatic. His chief works are *History of the Revolution in South Carolina, History of the American Revolution, History of the United States* and *Life of Washington.*

Ranching, the name given in the United States to an occupation carried on in the western part of the country. A ranch is a large tract of land devoted to the breeding of cattle. The peculiar character of the life of those who have these ranches in charge has largely disappeared before the advance westward of closely settled communities, but in the earlier days, and to a lesser extent at the present time, the outdoor life, with its risks and adventures, reared a class of care-free, hardy, temperate and bold ranchmen, who, known as cowboys, peculiarly typified the spirit of frontier life.

Ran'dall, SAMUEL JACKSON (1828–1890), an American statesman, born in Philadelphia and educated at the University Academy. He was at first a prominent Whig, but joined the Democratic party and entered the state legislature. He served for a time in the Union army, but in 1862 he was elected to Congress and was continuously reëlected until his death. He was early acknowledged to be the leader of the Democrats in the House and was speaker from 1876 to 1881. As such he guided the House through the dangerous crisis of the presidential election of 1876. In his later years he led a minority of his party in opposition to tariff reform and in favor of protection.

Randolph, *ran'dolf,* EDMUND JENNINGS (1753–1813), an American statesman, born in Williamsburg, Va., and educated at William and Mary College. He identified himself with the patriot party, served for a time on Washington's staff and in various political capacities in his native state, was a member of the Continental Congress in 1780 and became governor of Virginia in 1786. He was a conspicuous member of the constitutional convention and favored a strong central government, was opposed to numerous provisions of the Constitution and refused to sign it, but later advocated its ratification in Virginia. In 1789 he became first attorney-general of the United States, and five years later he succeeded Jefferson as secretary of state, but resigned in August, 1795, owing to political charges involving his honor, which were probably false. He was one of the foremost lawyers of his time and was a brilliant orator and writer.

Randolph, JOHN, of Roanoke (1773–1833), an American statesman, born at Cawsons, Virginia. He was a second cousin of Edmund Randolph. He entered the law, but turned his attention to politics, and in 1799 he was elected to Congress, where he became distinguished for his eloquence, wit, invective and eccentricity. For thirty years he was more prominent than any other American politician. He was the Democratic leader of the House of Representatives,

JOHN RANDOLPH

but quarreled with Jefferson and opposed the War of 1812; he opposed also the Missouri Compromise and stigmatized its Northern supporters as "Doughfaces." He sided against Jackson on the nullification question. From 1825 to 1827 he sat in the Senate. While in the Senate he characterized the coalition between Clay and Adams as a union of "the blackleg and the Puritan," and the result was a duel with Clay. In 1830 he was appointed minister to Russia. By his will he freed his numerous slaves and provided for their settlement in a free colony.

Randolph, PEYTON (1723–1775), an American statesman, born in Virginia, educated at William and Mary College and in London. He became royal attorney-general for Virginia and was later elected to the House of Burgesses, where he was active in opposition to the policy of Parliament. He was chosen delegate to the Continental Congress and was unanimously elected president of that body. He died suddenly in 1775.

Rangoon′, the capital and chief seaport of Burma, is situated on the Rangoon River, about 25 mi. from the sea. Since its occupancy by the British in 1852, Rangoon has undergone such changes that it is practically a new town, and its population has increased fivefold. The principal streets are broad and contain many large buildings and not a few handsome ones. There are the law courts, the postoffices, the Bank of Bengal, the customhouse, the Anglican and Roman Catholic churches, Rangoon College and other buildings. A large and increasing commerce is carried on with British, Indian and Chinese ports; and an extensive trade is conducted with inland towns, as far as Mandalay. The chief exports are rice and teak, and the imports are mainly manufactured goods. A number of rice mills have been erected; there is a government dockyard, and steam tram cars have been introduced. Population in 1901, 234,881.

Rank, the degree of authority and dignity attached to the various officers of the army and navy. The commander in chief is usually the executive head of the nation and commands the entire national force. In the United States the president holds the title under the Constitution, but he exerts his power through his secretaries of war and navy. The general officers of the army commanding bodies larger than a regiment are, in order of rank, the lieutenant general, who commands an army corps of a field army; a major general, who commands a division, and a brigadier general, who commands a brigade. At times the title of general has been used to designate the authority second only to the president; but the title has been allowed to lapse with the death or retirement of the man to whom it was granted by a special act of Congress. A regiment is commanded by a colonel aided by a lieutenant colonel; a battalion by a major; a company by a captain, assisted by a first and a second lieutenant. Below the second lieutenant the officers are known as non-commissioned, or warrant, officers, and such are sergeants and corporals.

Under the secretary of the navy, the highest grades are those of admiral and rear admiral. A vice admiral, when such a title is given, ranks second only to an admiral. Other commissioned officers are the captains of ships, commanders, lieutenant commanders, lieutenants, ensigns and midshipmen. The last mentioned are graduates of the naval academy, not yet fully commissioned. The corresponding ranks in the army and navy are as follows:

ARMY	NAVY
General	Admiral.
Lieutenant General	Vice Admiral.
Major General	Rear Admiral.
Brigadier General	Commodore.
Colonel	Captain.
Lieutenant Colonel	Commander.
Major	Lieutenant Commander.
Captain	Lieutenant.
First Lieutenant	Lieutenant (junior grade).
Second Lieutenant	Ensign.

Ranke, *rahn′ke,* LEOPOLD VON (1795–1886), a German historian. He studied in the University of Leipzig, became a teacher in the gymnasium of Frankfort-on-the-Oder in 1818 and was chosen professor of history at the University of Berlin in 1825. His first published work was a *History of the Romance and Teutonic Nations from 1494 to 1535.* This was followed by *Princes and Peoples of Southern Europe in the Sixteenth and Seventeenth Centuries*; *History of the Popes*; *History of Germany in the Time of the Reformation*; *History of France, Chiefly in the Sixteenth and Seventeenth Centuries*; *History of England in the Seventeenth Century,* besides a number of other works. At the age of eighty he undertook with undiminished vigor to write a history of the world, and a volume of this great work appeared every year until his death.

Ranun′culus, the typical genus of the buttercup family. The plants have entire, lobed or compound leaves and white or yellow flowers. The species are numerous and almost exclusively inhabit the northern hemisphere. Almost all the species are acrid and caustic, poisonous when taken internally, and many species, when externally applied, will raise blisters. The various species found in the United States are known chiefly by the common names of *crowfoot*, *buttercup* and *spearwort*.

Raphael Santi, *rah′fa el sahn′te,* (1483–1520), one of the greatest painters that ever lived, often spoken of as the "Divine Raphael," was born at Urbino, Italy. His father was Giovanni Sanzio, a painter of some merit, from whom young Raphael received his first instruction. At the early age of twelve, he was received into the studio of Perugino at Perugia, as one of his pupils, and he continued with that celebrated painter for six or eight years. The pupil was soon permitted to share in the master's work, and when he began to paint independently he was seen to have acquired Perugino's manner. In 1504, after a period of study and work at Siena, he visited his native town, and while there he painted *Christ Praying on the Mount of Olives*, a *Saint Michael* and a *Saint George*, the two last of which are now in the Louvre. Toward the end of the same year he proceeded to Florence, attracted thither by the fame of its numerous artists, and in this center of the highest artistic life of the time he studied diligently for a period of four years, with short intervals of return to his native city.

RAPHAEL

In Florence he rapidly gained a wider knowledge of his art and soon began to forsake the manner which he had adopted from Perugino. The sources from which he sought and obtained the artistic knowledge which enabled him to develop his new style were various. From Michelangelo he learned simplicity and strength of outline, from Leonardo da Vinci he acquired grace of expression and composition, while from Fra Bartolommeo he gained a subtler depth of coloring and from Masaccio a broader treatment of drapery and dramatic effects. During the last two years of his stay in this city he painted, in what is known as his Florentine manner, many of what are now considered his most important works. Of such may be mentioned the *Entombment of Christ, Madonna del Gran Duca, Holy Family, Christ Bearing the Cross* and *Marriage of Joseph and the Virgin.*

In 1508 he went to Rome, at the invitation of Pope Julius II, and began his work on the frescoes of the four chambers of the Vatican which are now known as the Stanze of Raphael. Here he executed the *Disputa,* or "Dispute of the Fathers of the Church," in which painting is recognizable the transition to his third manner, which is still more clearly manifested in the *School of Athens.* After the accession of the new pope, Leo X, Raphael became the chief architect of Saint Peter's, where he further distinguished himself. During this time he prepared designs for several palaces in Rome and other cities of Italy and finished the *Sistine Madonna,* probably the most famous of his works, for the Church of Saint Sixtus, in Piacenza. To this period also belong his easel-pieces of *John in the Desert,* his *Madonna and Child,* on whom an angel is strewing flowers, the *Madonna della Seggiola,* or *Madonna of the Chair,* and *Saint Cecilia* (See MADONNA). Raphael's last and unfinished painting, the *Transfiguration of Christ,* is in the Vatican. His pictures have never been excelled in the arrangement of figures and in the expression of human affection. He avoided all harshness, and united grace and elegance with the spirit of religion. Raphael died at the age of thirty-seven and was buried in the Pantheon with highest honors.

Rapier, *rą′pe ur,* a light, highly tempered, edgeless, finely pointed, sword-like weapon, used for thrusting. It is about three feet in length, and was long a favorite weapon for duels. Its use now, however, is restricted to occasions of state ceremonial.

Rappahan′nock, a river in Virginia, which rises in the Blue Ridge, runs e. s. e. about 155 mi.

THE SISTINE MADONNA — *Raphael*
Dresden, Germany

and flows into Chesapeake Bay. It passes the towns of Falmouth, Fredericksburg, Port Royal and Leeds and is navigable to Fredericksburg, about 100 miles.

Rar′itan, a river of New Jersey, formed by two branches, which unite and flow southeast into Raritan Bay, near Perth Amboy. It is 75 miles long and is navigable as far as New Brunswick.

Raspberry, *raz′ber ry,* the fruit of a well-known, shrubby plant, which is of the same genus as the blackberry. Several species are found growing wild in America and in northern Europe and Asia. In the United States the common *red raspberry* is very abundant, especially in the Northern states. It is a delicious fruit, but is not easily marketed, because it is so liable to be crushed and spoiled. The raspberry crop in the United States is second only to the strawberry, about 80,000,000 quarts being the annual output. Strictly speaking, the raspberry is a collection of small stone fruits, like little cherries, grouped together around a receptacle, from which they part easily when the fruit is ripe.

Rat, a common rodent mammal that is a pest to mankind almost everywhere. The best-known species are the *Norway,* or *brown, rat* and the *black rat.* The brown rat, which is the larger and stronger, grows to about nine inches in length and is of a brownish color above and white below. Supposed to have belonged originally to India and China, it became known in Europe about the middle of the eighteenth century; but it is now found in almost every part of the habitable globe. This is a voracious animal, swims readily in water and breeds four or five times in the year, each brood numbering about a dozen. The black rat is usually about seven inches in length, has a sharper head, larger ears and a much longer tail than the brown rat. It is also much less numerous and more timid.

Ratch′et, a piece of metal hung on a pivot at one end, the other being shaped so as to fit into the teeth of a wheel. The ratchet is used to prevent a backward motion of a wheel, as in the windlass and derrick, and also to turn a wheel by degrees, as in moving the carriage of a typewriter. A wheel with which a ratchet is used is called a ratchet wheel.

Ra′tel, a carnivorous animal of the badger family, found chiefly in South and East Africa and in India. The *Cape,* or *South African, ratel* averages about three feet in length, including the tail. The fur is thick and coarse, the color is black on the under parts, muzzle and limbs, while the tail, upper surface, sides and neck are of a grayish hue. Ratels are very fond of honey and destroy many nests of the wild bees, for which reason they are often called *honey badgers.*

RATEL

Ratio, *ra′she o* or *ra′sho,* the numerical relation which two quantities of the same kind bear to each other. It is expressed as the quotient obtained by dividing one quantity by the other. See PROPORTION.

Rationalism, *rasn′un al iz′m,* that doctrine which claims the right of reason to decide on all matters of faith and morals, whatever so-called "authority" may have to say on the matter. Rationalism has had perhaps its chief center and widest success in Germany; but its chief source may be found in the English deism of the seventeenth and eighteenth centuries. The first step taken by the English deists was an attempt to take from the doctrines of Christianity whatever is above the comprehension of the human reason; their next step was to discard from Christianity such facts as could not be verified by any man's experience. This led to an attempt to get rid of Christianity altogether. German rationalism was also influenced by the writings of Voltaire and by the skeptical freedom of thought which existed among the French *savants* at the court of Frederick the Great.

Rat′isbon or **Regensburg,** a town of Bavaria, capital of the Upper Palatinate, on the right bank of the Danube, opposite the mouth of the Regen, 65 mi. n. n. e. of Munich. Its narrow, crooked streets and turreted, medieval-looking buildings make it one of the quaintest of German towns. The most remarkable public buildings are the cathedral, the Rathaus, the Romanesque Church of Saint Emmeram, the royal villa and the mint. The manufactures include lead and colored pencils, porcelain and stoneware, hosiery, woolen cloth, leather, machinery, hardware, gloves, sugar and tobacco. There are also breweries and other works. Ratisbon existed under the Celtic name of *Radasbona* in pre-Roman times, and it was a Roman frontier fortress under the name of *Castra Regina.* Subsequently it became the residence of the old dukes of Bavaria, rose to the rank of an imperial city and continued long to be the seat of the imperial diets. The sieges which it has withstood number no less than seventeen. Population in 1900, 45,426.

Rat Kangaroo. See Kangaroo Rat.

Raton, *ra tone′*, N. M., the county-seat of Colfax co., about 130 mi. n. e. of Santa Fé and 8 mi. s. of the north boundary of the territory, on the Atchison, Topeka & Santa Fé railroad. It is the business center of a large farming and stock-raising region. There are also extensive coal fields in the vicinity. The railroad has a division terminal here, and the city contains railroad shops, stockyards, grain elevators, brick works and lumber yards. It has a national bank and three weekly newspapers. Population in 1900, 3540.

Rattan′, the long, slender stems of several species of tropical plants, that grow principally in India and the islands of the Pacific. Rattan is exported in large quantities and is used in Europe and the United States in the making of chairs, canes and other things which require light, flexible wood. The Chinese make sails, mats and cables from rattan. The fruit and the young shoots of some species are used as food.

RATTAN

Rat′tlesnake, a name of various poisonous American snakes, distinguished from the other members of the family by a series of horny rings on the end of the tail, which the animal vibrates in such a manner as to make a rattling sound. The rattlesnake is one of the most deadly of poisonous serpents, but hogs and peccaries kill and eat it, finding protection in the thickness of their hides and the depth of their layers of fat. A number of species belong to the United States and Mexico. East of the Mississippi the *banded rattlesnake* is the best-known and most dreaded species. It is naturally a sluggish animal, ready to defend itself, but seldom commencing the attack. It feeds on rats, squirrels and small rabbits and reaches a length of five or six feet. The *striped rattlesnake* is found from Mexico to Brazil; the *diamond rattlesnake,* sometimes eight feet long, greenish or golden-brown, marked on the back with diamond-shaped spots, is found in the swamps of the Southern states. The *Western black rattlesnake,* the *prairie rattlesnake,* the *horned rattlesnake* and various other species are scattered throughout the country. The venom in a rattlesnake's bite seems to vary with the season and with the individual. See Snake.

Rauch, *rowK*, Christian (1777–1857), one of the most distinguished of German sculptors, born at Arolsen. He received some instructions from the sculptor Ruhl, at Cassel, and afterward proceeded to Berlin to enter the personal service of King Frederick William III, of Prussia. His first two productions of note were *Sleeping Endymion and Artemis* and a bust of Queen Louise. In 1804 he went to Rome, where he made the acquaintance of Thorwaldsen and Canova and obtained the patronage of Wilhelm von Humboldt. He received an invitation in 1811, from the king of Prussia, to design a monument to Queen Louise, and he produced a noble work, which established his fame. From this time onward he was the sculptor of an immense number of works in all the branches of the statuary art. He was especially great in ideal figures and in portraiture.

Raven, a large bird of the crow family, whose plumage is entirely black. Like the crows, it can be taught to imitate human speech, and in a domesticated state it is remarkable for its destructiveness, thievishness and love of glittering things. It is a carrion-feeding bird, which can detect the presence of its food at a distance of several miles. Ravens are found in every part of the world, usually living in pairs, building rough nests on high cliffs, in which they lay their four or five greenish eggs, speckled with brown and black. Many superstitions are connected with the ravens, and they are frequently referred to in literature as symbolical of bad luck and as foreboding death. Edgar Allan Poe's poem *The Raven* is based upon this superstition. Ravens are long-lived birds, some of them reaching the age of seventy or eighty years.

RAVEN

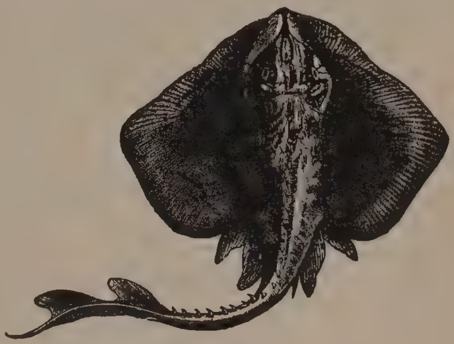
Raven'na, a town of Italy, capital of the province of the same name, about 6 mi. from the Adriatic and 43 mi. e. by s. of Bologna. The principal edifices are the cathedral, founded in the fourth century, but rebuilt during the eighteenth; the baptistry, and the numerous basilicas. The manufactures are of little importance, although glass and musical instruments are made and silk is spun and woven. The harbor of Ravenna was in early times large enough to contain the fleets of Augustus, but it gradually silted up, and the city is now connected with the Adriatic by a canal. Ravenna is an ancient place, and during the decline of Rome, in 404 A. D., Honorius made it the capital of the Western Empire. Thereafter it fell into the hands of Odoacer, who in his turn was expelled by Theodoric, under whom it became the capital of the Goths. It was recaptured by Belisarius, who made the town and its territory an exarchate. This exarchate was terminated by the king of the Lombards, who made Ravenna the metropolis of the Longobardic kingdom in 752. Pippin and Charlemagne, having succeeded in expelling the Lombards, made a present of Ravenna and its exarchate to the pope, with whom it remained till 1860. Population in 1901, including suburbs, 23,451.

Raw'lins, Wyo., the county-seat of Carbon co., 136 mi. w. by n. of Laramie, on the Union Pacific railroad. It is the business center for a large sheep-raising and mining region. There are electric lights and three hotels. It is the seat of the state penitentiary, and the railroad has repair shops here. Population in 1905, 3617.

Rawlins, JOHN AARON (1831–1869), an American soldier and administrator, born at East Galena, Ill. He studied law and was admitted to the bar in 1854. On the outbreak of the war, he became an ardent Unionist, was placed in command of an Illinois regiment and later was adjutant general on Grant's staff. From time to time he was promoted until he became brevet major general. President Grant appointed Rawlins secretary of war, but Rawlins died a few months later.

Raw'linson, HENRY CRESWICKE, Sir (1810–1895), an English soldier and diplomat, born at Chadlington, Oxfordshire. In 1827 he entered the military branch of the East India Company's service, and the following year he became interpreter of Hindustani and Persian and was rapidly promoted to important posts in the service in India, Persia and Arabia. At the same time he had opportunity to study the cuneiform inscriptions which he found at the various posts, and his reports, which were printed by the Royal Geographical Society of England, brought him great fame. On returning to England he received high honors, both in politics and from learned societies, and he was knighted in 1891. He was a member of the council of India for many years.

Ray, a family of fishes, including the skate, saw-fishes and sea-devils, recognized by the flattened body and by the extremely broad and fleshy fins, which seem to be mere continuations of the body at the side. The most common members of this group are the *skate*, or *thornback ray*, so named from the curved spines which arm the back and tail, and the *common gray*, or *blue, skate*, which possesses a sharply pointed muzzle and a somewhat lozenge-shaped body. The *starry ray* is so called from having a number of spines on its upper surface, rising from rayed, or



SKATE

starlike, bases; it reaches a length of thirty inches. The *sting ray* lives in the Mediterranean Sea, but it is also found on the British coasts. Its tail is armed with a long spine, which serves as a means of defense. This ray sometimes attains a length of ten feet. Members of the ray family are found in all seas, and more than one hundred species are known.

Ray'mond, HENRY JARVIS (1820–1869), an American journalist and politician, born at Lima, N. Y. He graduated at the University of Vermont and studied law in New York, but he contributed to Greeley's literary weekly, *The New Yorker,* and upon the founding of the *Tribune,* in 1841, became its assistant editor. After working for the *Courier and Enquirer,* he founded the *Times* in 1851. He was known as a prominent Whig in the state assembly, became lieutenant governor and was an important delegate to the first national convention of the Republican party, for which he wrote the memorable "Address to the People." He supported Seward and later followed Lincoln, but after the first Battle of Bull Run, he proposed a provisional government, in the belief that Lincoln was too hesitating. Raymond was speaker of the New York assembly, was an unsuccessful candidate for the United States Senate and supported President Johnson in Congress. He declined the mission to Austria, and in 1866 he left the Republican party, to help organize the National Union (Loyalists') Convention, for which he wrote the "Philadelphia Address." He wrote several historical and biographical works and did much to raise the tone of journalism.

Ra'zor, a tool used for shaving off the beard or hair. Razors are made of the best quality of steel and usually have thin blades, with concave sides. The back is thick, and the blade is fastened to the handle by a rivet, upon which it turns. When closed, the handle protects the edge of the blade. The safety razor has a guard which prevents cutting the face. The best razors are made in Sheffield, England.

Re or **Ra,** *ray,* the name of the god of the sun among the ancient Egyptians. He is represented like Horus, with the head of a hawk, and with the disk of the sun on his head.

Read, *reed,* OPIE PERCIVAL (1852–), an American author, born in Nashville, Tenn. He was engaged in newspaper work in Little Rock, Louisville, Nashville and Cleveland and was the founder of the *Arkansas Traveller.* Among his novels are *Len Gansett, A Kentucky Colonel, A Tennessee Judge, The Wives of the Prophet* and *The Jucklins.*

Read, THOMAS BUCHANAN (1822–1872), an American painter and poet, born in Chester co., Pa. His early life was unsettled and wandering. He did his first work in Boston. His paintings are full of poetic fancies, but the technical treatment is somewhat careless. His poems are marked by a fervent spirit of patriotism and artistic power in the description of American scenery and rural life. He is best known as a poet, especially for *Sheridan's Ride* and *Drifting.* He also wrote *The House by the Sea* and *Female Poets of America.*

Reade, CHARLES (1814–1884), an English novelist and playwright. He was educated at Magdalen College, Oxford, and held offices of honor in the university. His first novel, *Peg Woffington,* was expanded from the play *Masks and Faces,* written in conjunction with Tom Taylor. This was followed by *Christie Johnstone* and *Never Too Late to Mend,* one of his "novels with a purpose," in which he attacked the English prison system. *Hard Cash* deals with the abuses practiced in insane asylums, and *Put Yourself in His Place* is an attack on the excesses of trade unionism. The most artistic of his writings, *The Cloister and the Hearth,* dealing with the lives of the parents of Erasmus, appeared in 1861. Reade is not one of the great English novelists, but his plots, while often sensational, are always interesting.

Reading, *reed'ing.* A person reads either for his own entertainment or instruction or for the benefit of others. Accordingly, every teacher is concerned with both silent and oral reading for her pupils. In the article READING, METHODS OF TEACHING, the pedagogical side of the question is fully discussed. In the article LITERATURE, a general view of that subject in the different countries of the world is given. It remains for this article to suggest certain courses of reading which will prove profitable to children and adults.

READING FOR ADULTS. I. *Topical List.* The majority of people read for information and rarely give very much attention to the style in which thought is expressed. The reader of novels is content with the story and may follow the plot through with absorbing interest and fail to get the varied delights which a knowledge of the literary merits of the selection would bring. If, however, a person will read persistently the works of the best authors, beginning, perhaps, with stories and those works of fiction which are generally considered the most entertaining, always watching for beauties of expression and examples of power in any direction, he will gradually acquire the art of getting far more pleasure from his reading than he thought possible at first. It is not wise to follow an elaborate and systematic course of reading, which some one else recommends, unless enjoyment and interest accompany it. It is far better to confine one's self to those things which appeal directly to sympathy, affection, love and other emotions, than to feel that time spent in reading is wasted if it does not bring instruction. However, there are certain things which almost every one will enjoy, if he will give sufficient attention to them. These are the really great works in literature. A person desirous of acquiring a taste for good literature and of possessing a real acquaintance with the literature of inspiration might take up with profit a course of reading like the following and pursue it, in general, in the order in which the books are mentioned, omitting such as have previously been read. If taste and experience warrant, the reader may profitably begin anywhere in the list and read in accordance with his own inclination.

Fiction. *The Last of the Mohicans, The Spy* and *The Pilot,* by James Fenimore Cooper; *Uncle Tom's Cabin,* Harriet Beecher Stowe; *The Scarlet Letter* and *The House of the Seven Gables,* Nathaniel Hawthorne; *Lorna Doone,* R. D. Blackmore; *Last Days of Pompeii,* Bulwer-Lytton; *A Daughter of Heth,* William Black; *The Rise of Silas Lapham,* W. D. Howells; *Hypatia,* Charles Kingsley; *Ivanhoe* and *The Heart of Midlothian,* Sir Walter Scott; *Romola,* George Eliot; *Oliver Twist* and *David Copperfield,* Charles Dickens; *The Vicar of Wakefield,* Oliver Goldsmith; *Henry Esmond* and *Vanity Fair,* William M. Thackeray.

Narrative Poems. *Evangeline* and *The Courtship of Miles Standish,* by Henry W. Longfellow; *Lars,* Bayard Taylor; *Enoch Arden,* Alfred Tennyson; *Snowbound,* John G. Whittier; *Marmion* and *Lady of the Lake,* Sir Walter Scott; *The Knightes Tale,* Geoffrey Chaucer; *Paradise Lost,* John Milton.

Essays. *Dream Children* and *Dissertation upon Roast Pig,* by Charles Lamb; *Sir Roger de Coverley Papers* from *The Spectator,* Joseph Addison; *My Study Fire,* Hamilton W. Mabie; *Birds and Bees* and *Wake Robin,* John Burroughs; *Dream Days,* Kenneth Grahame; *Essays in Idleness,* Agnes Repplier; *My Study Windows,* James Russell Lowell; *Virginibus Puerisque,* Robert Louis Stevenson; *The Autocrat of the Breakfast Table,* Oliver Wendell Holmes; *Crown of Wild Olives,* John Ruskin; *Self Reliance, Compensation* and *The American Scholar,* Ralph Waldo Emerson; *John Milton, Joseph Addison* and *Warren Hastings,* Thomas Babington Macaulay; *Of Nature in Men* and *Of Studies,* Sir Francis Bacon.

Lyric Poetry. (1) Miscellaneous Lyrics: *The Rainy Day,* by Henry W. Longfellow; *To a Waterfowl* and *The Wind and the Stream,* William Cullen Bryant; *To a Daisy* and *The Daffodils,* William Wordsworth; *To a Mouse, For a' That and a' That* and *Auld Lang Syne,* Robert Burns; *The Chambered Nautilus,* Oliver Wendell Holmes; *The Destruction of Sennacherib,* George Gordon Byron; *An Old Played-out Song,* James Whitcomb Riley; *Ode to a Skylark,* Percy Bysshe Shelley; *To a Dandelion,* James Russell Lowell; *Annabel Lee,* Edgar Allan Poe; *L'Allegro* and *Il Penseroso,* John Milton. (2) Elegies: *Elegy in a Country Churchyard,* Thomas Gray; *Threnodia,* James Russell Lowell; *In Memoriam,* Alfred Tennyson; *Lycidas,* John Milton; *Adonais,* Percy Bysshe Shelley. (3) Sonnets: *Victor and Vanquished* and *The Two Rivers,* Henry W. Longfellow; *On His Own Blindness,* John Milton; *Night,* Alfred Tennyson; *Reading,* James Russell Lowell; *When She Comes Home,* James Whitcomb Riley; *Composed on Westminster Bridge,* William Wordsworth.

Dramas. *She Stoops to Conquer,* by Oliver Goldsmith; *The Rivals,* Richard Brinsley Sheridan; *Richelieu,* Bulwer-Lytton; *Macbeth, Hamlet, Romeo and Juliet, The Tempest, Much Ado about Nothing, Comedy of Errors, Julius Caesar, Richard III* and *King Lear,* William Shakespeare.

Such a list cannot be considered as complete, but it is really suggestive. No one can read the works mentioned here without having brought to his attention a number of other masterpieces in each group. If, in reading, a person becomes interested in the works of any writer, his reading should not be limited to the titles suggested here, but should be pursued as long as it seems pleasing and profitable and as time permits. In so reading, other writers will come into view, whose works deserve and should receive attention. The course of reading suggested, then, might be considered as a series of starting points for more extended reading.

Other departments of literature furnish different styles of reading which many will follow with interest and profit. Among the famous orations, for instance, are *The Scholar in a Republic* and

The Lost Arts, by Wendell Phillips; *Reply to Hayne*, Daniel Webster; *On Conciliation with America*, Edmund Burke. Many of the great histories and biographies are real literature and may be read with the same genuine pleasure that fiction gives. Among the biographies should be included Franklin's *Autobiography*; *Life of Charlotte Brontë*, by Gaskell; *The Early History of Charles James Fox*, by Trevelyan; *La Salle*, by Parkman. *The Rise of the Dutch Republic*, by Motley, and *The Conquest of Mexico*, by Prescott, are types of the finest literary history.

II. If a person desires to undertake a rather wide range of reading, in chronological order, he may get a comprehensive knowledge of English and American literature in its different epochs by reading the following books, in the order given:

English. *The Prologue* of the *Canterbury Tales* and *The Knightes Tale*, Geoffrey Chaucer; the ballads of *Chevy Chase* and of *Robin Hood*; *Of Nature in Men, Of Expense, Of Studies* and other essays, Sir Francis Bacon; the first and third cantos of *The Faerie Queene*, Edmund Spenser; *Hamlet, Julius Caesar, Twelfth Night, The Tempest* and *Richard III*, William Shakespeare; *L'Allegro, Il Penseroso* and *Paradise Lost*, John Milton; *Robinson Crusoe*, Daniel Defoe; *Gulliver's Travels*, Dean Swift; *The Spectator*, Joseph Addison; *Essay on Man*, Alexander Pope; *On Conciliation with America*, Edmund Burke; *Clarissa Harlowe*, Samuel Richardson; *Tom Jones*, Henry Fielding; *Roderick Random*, Tobias Smollett; *Tristram Shandy*, Laurence Sterne; *She Stoops to Conquer, The Deserted Village* and *Vicar of Wakefield*, Oliver Goldsmith; *The Ancient Mariner*, Samuel Taylor Coleridge; *Tales from Shakespeare* and *Essays*, Charles Lamb; *The Lay of the Last Minstrel, Lady of the Lake, Ivanhoe, Heart of Midlothian, The Talisman* and *Old Mortality*, Sir Walter Scott; *The Dream, The Prisoner of Chillon, Destruction of Sennacherib* and *Childe Harold*, George Gordon Byron; *Ode to the Skylark, The Cloud* and *Adonais*, Percy Bysshe Shelley; *Ode on a Grecian Urn* and *Ode to Autumn*, John Keats; *To a Daisy, The Solitary Reaper, The Daffodils, She Was a Phantom of Delight* and *Bereavement*, William Wordsworth; *Auld Lang Syne, Flow Gently Sweet Afton, Highland Mary, To Mary in Heaven* and *The Cotter's Saturday Night*, Robert Burns; *How Horatius Kept the Bridge, John Milton* and *Joseph Addison*, Thomas Babington Macaulay; *Heroes and Hero Worship*, Thomas Carlyle; *Sohrab and Rustum* and *Essays in Criticism*, Matthew Arnold; *Pendennis, Henry Esmond* and *Vanity Fair*, William M. Thackeray; *Adam Bede, Romola* and *Silas Marner*, George Eliot; *Last Days of Pompeii*, Bulwer-Lytton; *In Memoriam*, Alfred Tennyson; *Pippa Passes*, Robert Browning.

American. A chronological view of American literature should include the reading of such works as the following:

The Last of the Mohicans, The Pilot and *The Spy*, James Fenimore Cooper; *Thanatopsis* and *To a Waterfowl*, William Cullen Bryant; *The Sketch Book, Knickerbocker History of New York* and *The Alhambra*, Washington Irving; *The Raven, Annabel Lee, The Gold Bug* and *The Murders in the Rue Morgue*, Edgar Allan Poe; *The Scarlet Letter* and *The House of the Seven Gables*, Nathaniel Hawthorne; *Self Reliance, Compensation* and *The American Scholar*, Ralph Waldo Emerson; *Wild Apples, Walden* and *A Week on the Concord and Merrimac Rivers*, Henry D. Thoreau; *Uncle Tom's Cabin* and *Old Town Folks*, Harriet Beecher Stowe; *Snowbound*, John G. Whittier; *The Psalm of Life, The Reaper and the Flowers, Resignation, The Courtship of Miles Standish, Evangeline* and *Hiawatha*, Henry W. Longfellow; *The Chambered Nautilus, Old Ironsides, The Deacon's Masterpiece, The Guardian Angel* and *The Autocrat of the Breakfast Table*, Oliver Wendell Holmes; *She Came and Went, The First Snowfall, Two Angels, The Vision of Sir Launfal, Biglow Papers* and *My Study Windows*, James Russell Lowell. No mention is made of recent writers or of current literature. The magazines and public press will keep one informed as to these.

Reading for Children. In city schools the course of study is well established and the reading matter for every grade is carefully selected, so that teachers cannot well go astray. In the smaller graded schools and, in fact, in the district schools, the character and quantity of reading in each grade or class can easily be determined from courses of study or by following any one of the many excellent sets of modern readers. In most schools, too, more or less reading matter supplementary to the general course is available, and usually teachers have only to ask for more, in order to obtain it. The following list of supplementary works is intentionally brief, but yet it shows a course of reading which might be followed with profit in almost any school where no specific plans have been made for supplementary work. If the teacher finds that a book is not adapted to being read aloud or is too simple or too difficult for the pupils for whom it was assigned, then she has only to go above or below in the list till she finds a book which is adapted to the individual. A child will enjoy listening to books which he cannot read to his own satisfaction until a year or more later. Moreover, children will listen time and again to the stories they like best and seemingly get more and more enjoyment out of them at each reading; so, it is not always necessary to have a great number of books for any grade, if the few that are on hand suit the tastes of the readers. The following list should be helpful to parents, also, in selecting the reading for their children, whose rank in school they know or may easily learn. None of the books mentioned are expensive, and most of them may be obtained in cheap form from the school-book publishing houses.

Primary Schools. *A Hiawatha Primer*, Holbrook; *Classic Stories for Little Ones*, McMurry; *Stories of the Red Children*, Brooks; *Jingle Book*, Wells; *When Life is Young*, Dodge; *Fables and Folk Stories*, Scudder; *Counterpane-Fairy*, Pyle; *The Birds' Christmas Carol*, Wiggin; *Hans Andersen's Stories*; *Little Lame Prince*, Craik; *King of the Golden River*, Ruskin; *Wonder Book*, Hawthorne; *Fifty Famous Stories Retold*, Baldwin; *Stories of Indian Children*, Husted; *Ten Boys Who Lived on the Road from Long Ago to Now* and *Seven Little Sisters*, Andrews.

Intermediate Schools. *Alice's Adventures in Wonderland*, Carroll; *Tanglewood Tales*, Hawthorne; *Hiawatha*, Longfellow; *Black Beauty*, Sewell; *Captain January*, Richards; *Child Life in Poetry*, Whittier; *Chuck Purdy*, Stoddard; *Five Little Peppers and How They Grew*, Sidney; *Hans Brinker*, Dodge; *Courtship of Miles Standish*, Longfellow; *A Christmas Carol*, Dickens; *Enoch Arden*, Tennyson; *Birds and Bees*, Burroughs; *Jungle Book*, Kipling; *Story of a Bad Boy*, Aldrich; *Toby Tyler*, Otis; *Widow O'Callahan's Boys*, Zollinger; *Boys of '76*, Coffin; *Story of the Greeks*, Guerber; *First Book of Birds*, Miller; *Little Brothers of the Air*, Miller; *Lobo, Rag and Vixen*, Thompson.

Grammar Schools. *Rip Van Winkle*, Irving; *Snowbound*, Whittier; *Grandmother's Story of Bunker Hill*, Holmes; *The Deerslayer*, *The Pilot* and *The Last of the Mohicans*, Cooper; *Tom Brown's School Days*, Hughes; *Timothy's Quest*, Wiggin; *Little Book of Profitable Tales*, Eugene Field; *Vision of Sir Launfal*, Lowell; *Merchant of Venice*, *Julius Caesar* and *Macbeth*, Shakespeare; *Lady of the Lake* and *Ivanhoe*, Scott; *Hugh Wynne*, Mitchell; *Man Without a Country*, Hale; *Men of Iron*, Pyle; *Prince and Pauper*, Twain; *Stories from Homer*, Church; *Story of Siegfried*, Baldwin; Franklin's *Autobiography*; *George Washington*, Scudder; *Child Life in Colonial Days*, Earle; *War of Independence*, Fiske; *Boy Travelers in Southern Europe*, Knox; *American Citizen*, Dole; *Among the Law Makers*, Alton; *Biography of a Grizzly*, Thompson; *In Nesting Time*, Miller; *Pepacton*, Burroughs; *Wild Neighbors*, Ingersoll; *A-Hunting of the Deer and Other Essays*, Warner; *Life on the Farm*, Shepard.

High Schools. By the time pupils have reached the high school, they should be able to arrange their own courses of reading, or, if they need further suggestions in that line, either of the courses outlined for adults in the earlier part of this article will be found helpful. Reading is too valuable an art to be spoiled by careless indulgence in a pleasing habit. The young student especially should guard himself against the enticements of fiction. While, as has been indicated in the early part of this article, fiction serves an excellent purpose in the beginning of a course of reading and as means of entertainment throughout one's life, yet over-indulgence in that line dissipates the attention and prevents the growth of interest in profoundly greater fields of literature. It is wise to establish the rule that from a third to a half of a person's reading should be of a higher and more instructive type than can be found in stories and novels. The old books, the books that have been well established in their position for many years, are the ones that deserve the reader's first attention, for they have demonstrated their value. Nothing is lost in rereading a good book. Any work that deservedly ranks high gives more pleasure and confers more lasting benefit during the second reading than the first.

Reading, Mass., a town in Middlesex co., situated on the Boston & Maine railroad, 12 mi. n. w. of Boston. It is noted for its manufactures of boots and shoes, rubber goods, organ pipes and wire brushes, but it is chiefly a residence city. Population in 1905, 5682.

Reading, *red'ing*, Pa., the county-seat of Berks co., 58 mi. n. w. of Philadelphia and 55 mi. e. of Harrisburg, on the Schuylkill River, on the Schuylkill Canal and on the Pennsylvania and the Philadelphia & Reading railroads. It is connected with Philadelphia and with surrounding cities and towns by electric railways. The city has a beautiful situation on a bluff which rises gently from the river to Mount Penn, on the east. The Neversink Mountains, just south of the city, have a height of about 1000 feet. Several hotels and popular resorts, with magnificent views, are located on these mountains and are connected with the city by electric railways. The city is well built and well paved.

There are excellent public schools, with separate high schools for girls and boys, and the building for the latter cost $400,000. There are also excellent private schools and business colleges. The Keystone State Normal School is at Kutztown, not far away. The city is well supplied with hospitals and other charitable institutions. Some of the other prominent buildings are the city hall, the courthouse, the postoffice, the Academy of Music, the Masonic Temple, the Colonial Trust building, the Baer building and several hotels and business blocks.

The city is near the anthracite coal fields, in a region of large mineral wealth, and is in a very fertile agricultural country. There is a great variety of manufactures, about one-fourth of which consist of iron and steel products. Many of the steel projectiles used by the United States navy and the letter boxes seen on the streets throughout the country are made here. Here are the principal shops of the Philadelphia & Reading Railroad, many foundries, machine shops, breweries, cigar factories, knitting and hosiery mills, paper and wood pulp works, hat factories and carriage works. There are, in all, more than one thousand manufacturing establishments in the city. There are fourteen banking institutions, with a capital and surplus of $7,000,000 and deposits of $12,000,000. The place was first settled by Germans, but many English colonists came later and named it after Reading, England. It is the chief center of the Pennsylvania German population. It was laid out in 1748, was incorporated as a borough in 1783 and was chartered as a city in 1847. Population in 1900, 78,961; estimated in 1906 at 100,000.

Reading, METHODS OF TEACHING. Reading is a thought-getting and thought-giving process. The first is silent reading; the second, oral reading. The purpose of teaching a child to read is to enable him, first, to get the thought from the printed page, and second, to give that thought to others. Thought-getting, or learning to read, characterizes the greater part of the instruction in reading during the first three years the child is in school. The process includes the following steps, each of which should receive careful attention: (1) Learning the meaning of words; (2) learning the forms of words; (3) learning the sound of words, or their pronunciation; (4) understanding the thought in the sentence; (5) understanding the selection read.

PRIMARY GRADES. The reading in the primary grades includes that of the first three years in the well-graded school. During this time the child should not only learn to recognize words and sentences, but he should become reasonably proficient in reading from books within his capacity. In order that this end may be reached, the teacher should give careful attention to two phases of the work:

Methods. There are three methods of teaching primary reading in general use. They are known as the sentence method, the word method and the phonic method. The sentence method begins with the sentence, which the pupils are taught to read at sight, then proceeds to the study of the separate words in the sentence, so that they may be recognized alone. Since the sentence is the unit of thought and of expression, and since the child grasps things as wholes, this is by far the most desirable method to use at the beginning. It is much easier to teach a child to read a sentence, as, "I have a cat; John has a book," than it is to teach him to recognize the same number of words when they have no relation to each other. Hence the skilful teacher in reading selects, for her first lessons, certain objects in which the children will take a lively interest, and after obtaining from them, through questioning, desired sentences, she writes these upon the board in a plain hand, then has the pupils read them.

The next step is to lead the pupils to recognize the different words and phrases as they occur, by asking different questions and leading the pupils to make other statements about the object. This is usually accomplished by having the pupils read sentences containing the same words in different order. After drills of this sort the pupils quite readily recognize the different words in the sentence when written upon the board. From this it will be seen that the sentence method and the word method are inseparable. In fact, the so-called word method is only a phase of teaching reading by the sentence method.

The phonic method consists in the analysis of words, for the purpose of discovering the sounds of the letters which the words contain. It should not be introduced until the pupils have been reading for some months. In the second reader grade, it can be applied successfully if too much is not attempted, and in the third reader grade a good deal of attention should be given it, because when once learned, this method places the pupil in possession of the ability to discover and pronounce a great many new words for himself. From this it will be seen that the successful method in reading consists in the blending of the three methods here described, and no teacher can obtain the best results without using them all, and substantially in the order named.

The Recitation. The teacher should make careful preparation for each recitation. In doing this, she should observe the following points: (1) Plan to present the lesson in an interesting manner; (2) plan to have the class learn one or more new words; (3) review the words previously learned, by combining them in new sentences; (4) select for the lessons such sentences as will prepare the pupils for the reader. Before the book is placed in their hands, they should learn all of the words and many of the sentences found on the first eight or ten pages. In rural schools it is necessary that the books be placed in the hands of the pupils at the earliest possible date; hence, the teacher should give the first reader careful study, before beginning the work in reading with her entering class.

In the recitation, the reading and the word study must be carried along together, but if much time is needed for word study, greater progress is made by devoting one period to reading and another to drill on words. The teacher should lead her pupils to read in natural tones and with correct expression. In case they have difficulty with pronunciation, drill exercises on the difficult words should be given.

INTERMEDIATE AND GRAMMAR GRADES. The work in reading in these grades is for the purpose of leading the child to love good literature, to acquire an ability in silent reading and fluency in oral expression. In order that these ends may be secured, the intellectual element in reading should receive careful attention in these grades. Children cannot take interest in what they do not understand; hence, when a difficult selection is presented, it is wise for the teacher to discuss the selection with the class before the lesson is studied. In doing this, she should explain all the difficult passages. At the time of the recitation the pupil's understanding of these passages should be tested before the lesson is read; otherwise, he will stumble in the reading.

At this period the pupils should be introduced to the use of reference works, if such works are at their disposal. In case they are not, the teacher should give the information which the pupils cannot obtain for themselves. It is all-important that the class get the proper setting for the lesson. This setting should include the imaging of the scene and an understanding of the most important mythological, historical, geographical and other allusions which the selection may contain. The emotion necessary to proper expression will naturally follow the comprehension of the subject-matter.

In order that the teacher may successfully conduct exercises in reading in these grades, it is often necessary that she study broadly, as the selections frequently contain allusions to the various branches of natural science, mythology, history, art and the greater works of literature.

Much valuable assistance in teaching reading may be obtained from the prefaces found in all of the better series of readers. These should be carefully studied by every teacher. The teacher of primary reading should also make a thorough study of the readers which the pupils are to use. This study should be from the teacher's point of view and should enable her to obtain a thorough understanding of the plan of each book, of its gradation and of the steps necessary to lead the pupils from the first to the second reader, and from the second to the third reader. Many series of readers are defective in this respect and need more or less supplemental work. Consult Arnold's *Reading: How to Teach It.* Teachers of advanced reading will find valuable aid in Clark's *How to Teach Reading in the Public Schools.* See METHODS OF TEACHING; READING.

Reagan, *re'gan,* JOHN HENNINGER (1818–1905), an American statesman, born in Sevier County, Tenn. He received an elementary education and in 1839 went to the newly-organized Republic of Texas, where he began a little later the practice of law. After the admission of Texas to the Union, he was made a Federal judge and from 1857 to 1861 he was a member of Congress. At the secession of his state in 1861 he resigned, entered the provisional congress of the Confederacy and in March, 1861, became postmaster-general of the Confederate states. He also served for a time in 1865 as secretary of the treasury. He was captured with President Davis in May, 1865. He was again elected to Congress in 1875 and served for twelve years, being the author of the Reagan Interstate Commerce Act, which was passed in 1887. In that year he was elected to the United States Senate and resigned in 1891 and became chairman of the Texas state railroad commission.

Realism, *re'al iz'm,* a doctrine based on the theory that the general notions which are regarded as necessary truths do not exist in the mind prior to appearance, but are the products of sensation and perception. Some advocates of this theory went so far as to assert that individuals of a class exist in name only and that the only reality is the universal. For example, *tree*, as a general notion, has existence, is a reality, but *trees* have no individual existence, for they are all but slightly varying expressions of one existence, which is named by the general term. See CONCEPT; REASON.

Realism in literature is a quality of certain works, especially in fiction, that depict things as they actually are and subordinate plot to delineation of character. Realism carried too far becomes nauseating and vicious, but the better kind of realism has made the modern novel one of the great teachers of the time.

Re′alists. See PEDAGOGICS, subhead *Realists.*

Real Property or **Real Estate,** in law, generally speaking, things immovable or permanent, as land, including all immovable fixtures upon it, as buildings, timber and minerals, and all *estates,* or legal holdings, of lands, which will endure for life or will descend to heirs. It is distinguished from *personal property,* in a general way, by being inheritable.

Real Schools (German, *Realschulen*) are those educational institutions of Germany, between the elementary school and the university, which have for their special object the teaching of science, art, the modern languages and other branches of secondary instruction. They should be distinguished from the ordinary grammar schools and gymnasiums, in which the classical languages hold a more important place.

Reaping Machine, a machine used in harvesting wheat, oats and other small grains. The machine is drawn by two or more horses, the cutting machinery being driven by gearing connected with the wheels on which the machine moves over the field. The cutting is done by triangular knives, fastened to a steel bar and moving back and forth between long steel points, called *fingers.* The fingers are attached to a larger steel bar, in which the knife bar operates. As the machine is moved forward, the fingers press the grain up against the knives, which are geared so as to move rapidly. In the original reaper the grain as it was cut fell upon a table, from which it was raked by some one following the machine or sitting upon a seat back of the driver. Later a raking apparatus was supplied, and in time this was replaced by a binding apparatus, forming what is now known as the harvester and binder, or self-binder.

The modern harvester, in addition to the cutting apparatus, contains a table upon which the grain falls and from which passes a canvas belt for carrying the grain to the binding box, where it is packed until enough to form a bundle has been gathered. When the box is filled, a catch operating the binding apparatus sets this in motion and the bundle is firmly tied with binding twine, when it is thrown by a spring from the binding box, either upon a carrier or upon the ground, according to the pattern of the machine. It requires four horses to operate one of these machines successfully, and under ordinary conditions it will cut ten acres of grain a day.

The reaping machine in its present state of perfection is due largely to Cyrus H. McCormick of Illinois. While there are many patterns on the market, all are built on the plan which Mr. McCormick originated. American reapers are now found in all parts of the world where grain is raised in large quantities, and it is estimated that over 300,000 machines are sold annually. A special form of reaper is used for harvesting corn. See CORN HARVESTER; MOWING MACHINE.

Reason, *re′z′n,* the phase of thinking in which the comparison of two judgments leads to the formation of the third. In reasoning we are conscious that the conclusion is what it is because of the agreement or disagreement of the judgments compared, as:

All wood burns.
This object is wood.
Therefore this object will burn.

Reasoning is the most difficult stage of thinking and develops slowly. Correct conclusions depend upon accurate judgments and the following of the laws of thought. There are two general methods of reasoning, known as induction and deduction, each of which is described under its appropriate title. See, also, CONCEPT; JUDGMENT; THOUGHT; LOGIC; SYLLOGISM.

Rebel′lion, the taking up of arms, whether by natural subjects or others residing in the country, against a settled government. By international law rebellion is considered a crime, and all persons voluntarily abetting it are criminals, whether subjects or foreigners. When a rebellion has attained such dimensions and organization as to make of the rebel party a state *de facto,* and its acts reach the dimensions of war *de facto,* it is now the custom of the state to yield to the rebels such belligerent privileges as policy and humanity require and to treat captives as prisoners of war.

Receipt, *re seet′,* a written acknowledgment or account of something received, as money or goods. A receipt of money may be in part or in full payment of a debt, and if true, not fraudulently secured and uncontradicted by other evidence, it operates as an acquittance or discharge of the debt or part of the debt which it includes. Except in unusual circumstances, it cannot be overthrown by oral testimony.

Receiver, *re seev′ur,* a person specially appointed by a court of justice to receive and disburse, under direction and restriction, the profits of property which is in dispute in a cause before that court or which, for some other valid reason, as the infancy or lunacy of a proprietor without legal guardian, or joint ownership of property which cannot be administered jointly, requires the management of a disinterested person. His powers are now closely defined by statute and are moreover limited by the judicial decree appointing him.

Rechabite, *rek′a bite,* among the ancient Jews, one of a family or tribe of Kenites, whom Jonadab, the son of Rechab, bound to abstain from wine, from building houses, from sowing seed and from planting vines (*Jer.* xxxv, 6, 7). In modern times a benefit society composed of total abstainers from intoxicating drinks is called the Independent Order of Rechabites.

Recife, *ray se′fay.* See Pernambuco.

Reciprocity, *res e pros′i ty,* a term in economics, commonly applied to the arrangement whereby two nations mutually agree to import from each other certain goods, either without duty, or with duties which are equivalent and are, in general, lower than the duties exacted on the same goods from countries with whom no agreement exists. The McKinley tariff law of 1890 provided for the admission of sugar and certain other articles free from those countries which gave reciprocal trade favors to the United States. The Dingley Act, now in force, greatly limits the government's power in respect to framing reciprocity treaties, making them dependent upon the Senate's sanction. Under the law, treaties are now in force with France, Portugal and Italy. In 1903 a reciprocity treaty was made with Cuba, which was bitterly fought by the beet sugar interests, but was finally passed. The demand for reciprocity has been steadily growing in recent years, but has made little actual progress, owing to the determined opposition of protected industries.

Recitative, *res e ta teev′,* a species of vocal composition which differs from an *air,* in having no definite rhythm and no decided melody, but approaches in tone and rhythm the accents of spoken language. It is used in operas and oratorios, to express some action or passion or to relate a story. There are two kinds of recitative, *unaccompanied* and *accompanied.* In the first, only a few occasional chords are struck on an instrument or instruments, to give the singer the pitch and to indicate to him the harmony. In the second and more common form, all or most of the instruments of the orchestra accompany the singer.

Re′construc′tion, in American history, the name given to the process by which the states that seceded from the Union in 1860–1861 were restored to their natural relations with the other states. The problem of reconstruction was absolutely new to the Union at the close of the war. It had already been considered, however, by President Lincoln, whose theory was that the act of rebellion in each state was not the act of the state, but of disloyal conspirators within the state. The states therefore were still members of the Union and could be restored to normal relations with it by the creation of loyal state governments. He also considered this restoration of loyal state governments to be an executive, rather than a legislative, act, because the power of pardon rested with the executive. The Southern view was that the acts of secession were invalid, and that their repeal was all that was necessary for the establishment of normal relations. There was also the view of a Congressional party, that by their rebellion the states were deprived of all civil government; though they continued to exist, they were disorganized districts, subject to the authority of the United States, to be expressed by Congress. This view was expressed in a bill passed in July, 1864, known as the Wade-Davis Bill. It was vetoed by the president and was not repassed. Charles Sumner fathered a peculiar theory, known as the theory of "state suicide," that the attempt to secede forfeited the rights of the state under the Constitution and reduced it to the position of a territory. The most radical view of all was that of Thaddeus Stevens, which held that rebellion put an end to the existence of the state and reduced it to the status of a conquered province.

Under President Lincoln's plan, military governors had been appointed for parts of the South, including Louisiana, Arkansas and Tennessee, who were to reëstablish loyal governments. He also proclaimed pardon to all who would take an oath to support the Constitution of the United

States, with the exclusion of certain persons who had held office under the Confederacy. He also proposed that when one-tenth of the eligible voters in each state had taken that oath, the president should recognize any loyal government which those people established as the government of the state. Such governments were established in Louisiana and Arkansas, but their representatives were denied admission to Congress, and later the representatives of Tennessee were denied admission upon a similar basis.

Just at this critical time, President Lincoln was assassinated, and his successor was Andrew Johnson, who was capable, but utterly tactless. He continued Lincoln's policy, issued a proclamation of amnesty and pardon and extended the loyal governments under Lincoln's plan to North Carolina, Mississippi, Georgia, Alabama, South Carolina and Florida. Meantime, the legislatures of the reconstructed states had passed laws which, though admitting the abolition of slavery, had provided conditions for the freedmen little better than slavery, and the Federal government had organized a "bureau of refugees, freedmen and abandoned lands," known as the Freedmen's Bureau. This bureau fostered idleness, improvidence and arrogance; the so-called "black laws" bred vice and antagonism.

These results led Congress to pass still more radical laws, among which was the Civil Rights Bill, which was passed in March, 1866. It declared the negroes to be citizens, prescribed for them equal civil rights with the whites and gave the Federal courts jurisdiction over cases arising in interference with these rights. The president vetoed the bill, but it was soon passed over his veto. His constitutional objections, however, were considered so sound, though not admittedly by Congress, that the substance of the law was incorporated in the Fourteenth Amendment of the Constitution. The work of the Freedmen's Bureau was extended by a law passed in July, 1866. The bill was vetoed, but was repassed by a two-thirds majority.

In the elections of 1866 the Congressional view was endorsed by a vast majority, and Congress proceeded to reconstruct the Southern states independently of the president. It made suffrage universal in the District of Columbia, repassed the measure over the president's veto and threatened to impeach him. It passed the Tenure of Office Act, to prevent the president from removing cabinet officers who disagreed with him, and passed this bill over his veto. It passed two reconstruction acts, dividing the South into military districts (over each of which was placed a general, subject to the command of the commanding general of the army) and guaranteeing admission to the Union for each state when it had adopted a constitution containing the principle of universal manhood suffrage and when its legislature had adopted the Fourteenth Amendment. President Johnson vetoed both of these bills, but they were repassed over his veto.

The results of these measures were almost worse than even President Johnson or the Southerners themselves had anticipated. They practically placed all political power in the hands of the negroes or of Northern adventurers who had gone south for the express purpose of gaining plunder. For almost ten years this condition of affairs continued. The debts of the states were increased by millions of dollars without the slightest return, and the most corrupt and immoral element of the nation was in control. The leading white men of the South were excluded from participation in the government and were insulted by those who had usurped their places. During this time, however, one agency was active in restoring the power to the hands of the decent element of the South. That was the organization of secret societies, among which was the Ku Klux Klan, for the purpose of intimidating the negroes and preventing them from voting or exercising power (See KU KLUX KLAN).

Meantime, Congress and President Johnson had come to an open clash over the suspension of Secretary Stanton. The president was impeached for violating the Tenure of Office Act, but after a trial before the Senate was acquitted, for the lack of one vote to make the necessary two-thirds for conviction. In the course of the year 1868 North Carolina, South Carolina, Louisiana, Georgia, Alabama and Florida were readmitted to the Union, having accepted the Fourteenth Amendment. In the same year President Johnson, who had lost the support of the Republicans and had not gained that of the Democratic party, which he had deserted four years before, was not nominated for reëlection, and General Grant was elected over Horatio Seymour of New York. In the following spring the Fifteenth Amendment was ratified, declaring that the "right of the citizens of the United States to vote shall not be denied or abridged on account of race, color or previous condition of servitude." The Congressional reconstruction policy was continued during Grant's administration, and all the former states were admitted to the Union before the end of 1870. Though the Fourteenth and Fifteenth amendments had been accepted by the South, Congress was not content and passed acts known as Force Laws, to provide for their enforcement, giving the United States the right to intervene for the protection of the rights of citizens of the states and giving to the president power to suspend the writ of habeas corpus.

However, this was not long to continue. An amnesty act was passed by Congress in May, 1872, removing the disqualification of ex-Confederates; and soon after, the Supreme Court supported by several decisions the trend of public sentiment, admitting of a policy of justice, liberality and conservatism in reconstructing the South. Though the protest of many Republican leaders in 1872 failed to defeat Grant, it did result in the nomination and election of a conservative Republican in the person of Rutherford B. Hayes, at the next election. When he withdrew the army of Federal troops from the South, the reconstruction period was ended.

Rec'ord, specifically, an official record of any writing, or account of any facts and proceedings, whether public or private, entered in a book for preservation. In a popular sense the term *records* is applied to all public documents preserved in a recognized repository. The records or archives of the United States are easily accessible, and proper recommendation will open them to any one who wants to use them for scientific purposes. In a legal sense, *records* are authentic testimonies in writing, of judicial acts and proceedings, the courts of which the proceedings are thus preserved being called *courts of record.*

Red, one of the primary colors, the color of that part of the spectrum which is farthest from the violet. The red rays are the least refrangible of all the rays of light (See LIGHT, subhead *Spectrum*). Red pigments or coloring matters include vermilion, realgar, cochineal, lakes and madders, coal-tar colors and other substances. By varying the intensity of the color, numerous shades of red can be produced. Because it is the color of blood, red is associated with anger and other violent passions. Combined with blue, it forms one of the national colors of England and of the United States. The red flag has been universally adopted as the emblem of the Social Democrats. In the United States this flag is used by the anarchists.

Red Bank, N. J., a town in Monmouth co., about 25 mi. s. of New York City, on the Shrewsbury River, at the head of navigation, and on the Central of New Jersey and the Pennsylvania railroads. It has steamboat connection with the coast cities, is an attractive residence place and has become a popular summer resort. There is a considerable trade in fruit and farm products, and the town contains a large canning factory and manufactures of carriages, clothing, boilers and other articles. It has the Shrewsbury Academy, a fine high school, several private schools and a public school library. The place was settled in 1650 and was incorporated as a town in 1872. Population in 1905, 6263.

Red'bird, the popular name of several birds in the United States. See CARDINAL BIRD; BALTIMORE ORIOLE.

Red Cedar, a species of juniper which grows in North America and the West Indies. See JUNIPER; CEDAR.

Red Cross Societies, societies established immediately after the Geneva Convention of 1863, for the purpose of assisting the wounded in time of war. More than forty nations now have agreed to the principles of the Red Cross movement, and local societies all over the world may be joined in work by a central international committee. The distinctive badge of the societies is a red Maltese cross on a white ground. The order of the Royal Red Cross was instituted by Queen Victoria in 1883, as a reward for ladies who have devoted themselves to the work of nursing the sick and wounded in war. The decoration consists of a red Maltese cross bearing the words, "Faith, Hope and Charity." In the United States, where the national association was established in 1881, the operations of the Red Cross societies are not confined to assistance in time of war, but they act in all public calamities and care for the injured and unfortunate. See BARTON, CLARA.

Redfish, a name applied to several fishes. One species, the *red drum,* is of a grayish-red tint and is found on the southern coast of the United States. It attains a length of five feet and is valuable as a food fish. Another species is found in southern California and is sometimes called the fatfish. It has beautiful colors, varying from deep red to blackish purple.

Red'grave, RICHARD (1804–1888), a British painter, born in London. He became a student of the Royal Academy in 1826. His first notable picture was *Gulliver at the Farmer's Table,* and following this were *The Reduced Gentleman's Daughter, Ophelia* and *Country Cousins.* In 1851 he became a Royal Academician. From being head master of the government school of design he became inspector-general of art schools and arranged the Museum of Art at South Kensington. He was joint author with his brother of *A Century of Painters.*

Red Jacket (1751–1830), a Seneca indian chief, whose real name was Sagoyewatha. During the Revolution he was a consistent friend of the British, fighting with all his influence every treaty for the cession of indian lands to the United States government. During the War of 1812, however, he gave the Americans valuable information about British plans. In his last years he became a confirmed drunkard and vigorously opposed the introduction of education and religion among his people, though he had favored this step in earlier years.

Red Race. See Indians, American.

Red River, a large river, the southernmost of the great tributaries of the Mississippi. It rises in northern Texas and has several sources, the chief, besides the main stream, being the North and South forks, which unite with it on the boundary of Texas. The stream then flows east-southeast, forming the boundary between Texas and Oklahoma, cuts off a corner of Arkansas, flows through Louisiana and falls into the Mississippi. Its total course is estimated at 1550 miles. Its chief affluents are the Washita, which joins it in Louisiana, and the False Washita. Much of its course is through rich prairies. About 1200 miles of the river are useful for navigation, but its mouth at low water can be entered only by boats of light draft.

Red River or **Song-Koi,** a large river of Tongking, French Indo-China. It flows southeast from the mountains of southern China, passes Hanoi, the capital of Tongking, and falls by several mouths into the Gulf of Tongking. Its total length is about 600 miles.

Red River of the North, a river which rises in Minnesota, flows s. and s. w., and then nearly n., crossing from the United States into Manitoba, where it falls into Lake Winnipeg. Its entire length is about 700 miles, and it is navigable for light vessels as far as Fargo, though steamers seldom ascend it above Grand Forks. In Manitoba it receives the Assiniboin, another large stream, at its junction with which, the town of Winnipeg is located.

Red Sapphire. See Ruby.

Red Sea or **Arabian Gulf,** a branch of the Indian Ocean, communicating with it by the Strait of Bab-el-Mandeb, stretching in a n. n. w. direction between Arabia, on the e., and Abyssinia, Nubia and Egypt, on the w., and connected with the Mediterranean, on the n., by the Suez Canal. It is about 1450 miles in length, and in width it averages about 180 miles, but it diminishes gradually at its extremities. At the northern end it divides into two branches, one of which, forming the Gulf of Akabah, penetrates into Arabia for about 110 miles, with an average breadth of about 12 miles; while the other, forming the Gulf of Suez, lies between Arabia and Egypt for about 170 miles, with an average breadth of about 20 miles. The shores of the Red Sea consist generally of a low, sandy tract, terminated by the abutments of a lofty tableland, from 3000 to 6000 feet high. Occupying a long, deep valley, this water expanse has gradually been divided into three channels, formed by coral reefs and islands. In the main channel the depth reaches in some places over 7000 feet, but it diminishes toward the end. The Gulf of Akabah is much deeper than the Gulf of Suez. From October to May, when the wind sets steadily from the south, a strong current flows in from the Strait of Bab-el-Mandeb; while from May to October, the north wind continues to blow, giving the current a southern direction. The result of this is to raise and lower the sea level by several feet north and south, alternately. The principal harbors of the Red Sea are, on the African coast, Suez, Kosseir, Suakim and Massowa; and on the Arabian coast, Jidda, Hodeida and Mocha. The through traffic has been immensely increased by the Suez Canal,

Red'start, a pretty American warbler, whose prevailing color is black, but whose wings and tail at the base, as well as the sides, are bright orange-red, and whose lower parts are mainly white. It is an active bird and jumps from limb to limb of the trees, searching everywhere for insects, which it gathers with great skill. It is a summer resident of the northern United States, but goes south for the winter. There are a number of more brilliant species inhabiting Mexico and Central America. The European redstart is a member of the thrush family. See Birds, *color plate,* Fig. 9; Nests, *color plate,* Fig. 2.

Red'wing, Minn., the county-seat of Goodhue co., 40 mi. s. e. of Saint Paul, on the Mississippi River, at the head of Lake Pepin, and on the Chicago Great Western and the Chicago, Milwaukee & Saint Paul railroads. The city is in a productive agricultural region, containing deposits of fire clay. It has a large trade with the surrounding country and contains sewer pipe works, furniture factories, lumber mills, stoneware works and other establishments. The city contains the Hague Synod Theological School, Red Wing Seminary, Lutheran Ladies' Seminary, a high school, a state training school and a public library. There are two hospitals and three banks. The place was settled in 1853, and the city was chartered in 1864. Population in 1905, 8149.

Red'wood, a large tree of the cypress family, found on the western slope of the Coast ranges in northern California and in Oregon. The trees grow to an immense size, on the slopes attaining a height of two hundred twenty-five feet and a diameter of ten feet; some trees on the lower lands are three hundred fifty feet tall and have a diameter of fifteen or twenty feet. The trunk is straight, slightly tapering and free from branches for one hundred to one hundred fifty feet. The bark is of a reddish-gray color and of a coarse texture. It is several inches thick and resists fire. The crown consists of comparatively few branches, bearing small leaves. The wood is red, but soon fades on exposure to the air. It is of fine grain, soft, easily worked and takes a fine finish; consequently, it is valuable for building purposes and for finishing the insides of dwellings.

The redwood at present affords the most important source of lumber in the Pacific States and is being cut so rapidly that there is danger of its complete destruction. It belongs to the same genus as the big tree, for a description of which, see SEQUOIA; also, see LUMBER.

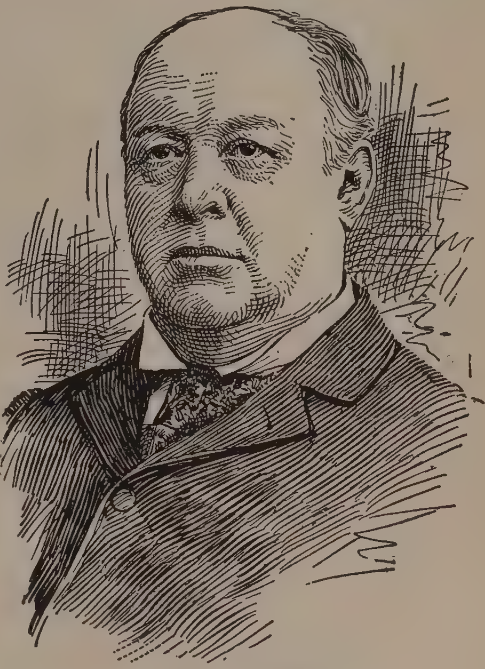
Reed, THOMAS BRACKETT (1839–1902), an American statesman, born at Portland, Maine, and educated at Bowdoin College. He studied law and practiced for a time in Portland, served a year in the navy during the Civil War as acting assistant paymaster, then returned to his practice and was elected to the Maine legislature. He began twenty-two years of continuous service in Congress in 1877 and was chosen speaker three times. In the fifty-first Congress (1890), Mr. Reed practically destroyed filibustering by ruling that those members who were actually present but refused to vote, in order to prevent a quorum, should be counted. This precipitated a fierce parliamentary battle in the House and earned him the title of "Czar" Reed, but soon thereafter the Supreme Court sustained his decision. In 1896 Reed was a candidate for the Republican nomination for president. He resigned from Congress in 1899 and practiced law in New York until his death.

Reed Bird. See BOBOLINK.

Reeve. See RUFF.

Reeves, JOHN SIMS (1822–1900), an English tenor singer, born in Kent. He studied under leading English teachers and made his début at Newcastle in 1839. He was soon recognized as the greatest living English tenor, and he continued to gain new successes at each appearance until his retirement about 1890. He devoted himself especially to oratorio and ballad singing.

Ref'eren'dum, a term used to denote the reference to the voters of resolutions or laws passed by their representatives. If these, when so referred, are accepted by the majority of the voters of the precinct, then they become law; but if they are rejected, then the rejection is final. The referendum may be *obligatory* or *optional*. In the latter case it may be demanded on the requisition of a certain number of voters. The referendum policy is established in the Swiss Confederation, and it is growing in popularity in the United States, where it is used, however, more for expressions of public policy than for actual governmental purposes. The *initiative* is the policy in accordance with which the voters may propose and vote upon legisla-



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tion without the intervention of the law-making body.

Reflec′tion, specifically, in physics, the change of direction which a ray of light, radiant heat, sound or other form of radiant energy, experiences when it strikes a surface and is thrown back into the same medium from which it approached. When a perfectly elastic body strikes a hard and fixed plane obliquely, it rebounds from it, making the angle of reflection equal to the angle of incidence. This is also the case with light, but the light undergoes the change known as polarization. See LIGHT, subhead *Reflection*; POLARIZATION OF LIGHT.

Re′flex Action, primarily those unconscious and involuntary movements caused by communication of sensory with motor nerves through a nerve center, as a ganglion or plexus (See NERVOUS SYSTEM; GANGLION). The term is also extended to include conscious acts which do not involve deliberation, and from the physiological point of view nearly all acts contain a reflex element.

The simplest organism of reflex action is a sensory nerve, extending to a nerve cell, in which also originate the fibers of a small motor nerve, which extends to a muscle, gland or blood vessel. When the outer extremity of such a sensory nerve is stimulated, the impulse is reflected back through the nerve cell along the motor nerve, causing action of the organ to which that nerve extends. All reflex actions are more or less complex and involve several nerves and often a number of nerve centers. The following descriptions refer only to those reflex actions which occur in the voluntary muscles.

If the cerebrum (See CEREBRUM) be removed from a frog and the animal placed in its natural position, it will sit as though it had not been injured. If acid is applied to the skin, the frog will try to remove it with the foot. If a toe is pinched, it will attempt to withdraw the foot. If thrown into the water, it will swim. In short, it will perform all movements which an uninjured frog would perform, with the exception that all stimulus to action must be applied from without. If left to itself the frog will die in the position in which it was placed. The removal of the brain destroyed all power of volition, and all of the acts of the animal are unconscious and involuntary and the result of reflexes through the nerve centers. When an animal is beheaded, violent movements follow. In warm-blooded animals these last but a short time, because the spinal cord does not retain life under those conditions; but in cold-blooded animals, such as snakes and turtles, the spinal cord will retain its vitality often for several hours after the brain has been removed; hence, cold-blooded animals are much more satisfactory for experimental purposes in the study of reflex action, since all movements after the removal of the brain are involuntary and reflex.

There are many illustrations of involuntary reflex action in ordinary life. The person sleeping will brush a fly from the face without awakening. If one steps upon a tack or other sharp object with the bare foot, the foot is withdrawn without any act of will and before the sensation has reached the brain. Reflex actions also occur through sight and hearing and have a similar effect upon the voluntary muscles, though it is usually general instead of local. One walking through the grass may be caused to jump by the sudden appearance of some small animal, and one frequently jumps on hearing a sudden sound. Many other illustrations of this sort of reflex action will occur to the reader. See HABIT; INSTINCT; WILL.

Ref′orma′tion, THE, a term applied to a revolt in Europe in the sixteenth century against papal supremacy and certain doctrinal tenets of the Church of Rome. For many centuries, western Europe had been a religious unit, under the primacy of the pope, the papal power being at one time almost absolute in temporal, as well as in spiritual, matters. As early as the fourteenth century, several of the princes and sovereigns of Europe refused the pope the right to dictate in temporal or governmental affairs, but previous to the opening of the sixteenth century there had been comparatively few who denied the supreme and infallible authority of the pope in matters touching religion. Among these few were Wycliffe, Huss and Jerome.

The causes leading to the sixteenth century reformation were many. The great intellectual awakening known as the Renaissance, or revival of learning, increased the number of scholars, and the invention of printing scattered written works broadcast over Europe—not only the Bible, but the writings of the men who had begun to doubt the scriptural authority for some of the doctrines and ceremonies of the Church, such as devotion to the Virgin Mary, the invoking of saints, confession to a priest and the nature of the elements used in the sacrament of the Lord's Supper. These writings of course led to questionings and criticism. In addition to these causes was the need of a thorough reform within the Church itself—a need which was recognized by all earnest and spiritual-minded men, the only difference of opinion being as to the manner in which the work of purification should be effected. A fourth cause may be found in the feeling of jealousy with which the temporal princes regarded the papal power.

But the actual occasion of the outbreak of the Reformation was the sale of indulgences in Germany. It has always been a tenet of the Catholic Church that indulgences remit penalties due to sin after severe repentance and aid of the sacrament of penance. Leo X, in 1513, being desirous to complete the great temple of Saint Peter's, which Julius II had commenced, granted an indulgence to those who would contribute financial aid for that purpose. A certain Johann Tetzel, to whom the archbishop of Magdeburg had delegated the power of dispensing indulgences in Saxony, carried out his commission in such a way that wrong ideas about the effect of indulgences began to spread among the ignorant and credulous, and many intelligent Christians opposed his methods. Martin Luther, an Augustinian monk and teacher of theology in the University of Wittenberg, was foremost among those who denounced Tetzel, and as he appeared in the vicinity of Wittenberg just at the time of the celebration of a yearly festival, when it was customary to post on the church doors bulletins of general interest to the parish, Luther accordingly nailed to the door ninety-five theses, warning the people against such persons as Tetzel and emphasizing the necessity of a penitent heart and a loving spirit in making gifts to the Church. Copies of these theses were scattered broadcast, and all the continent was soon plunged into a tumult of controversy. Luther, meanwhile, devoted himself to further study of the Bible, Church history and canon law, in order to defend the position he had taken, and he drifted further and further from the Church. His public utterances and writings became bolder, and he was soon attacking the entire system and body of teachings of the Church of Rome. He maintained that contrition, confession and absolution were not necessary to secure salvation, denied the infallibility of the councils of the Church and asserted that the Bible was the only foundation of faith and that bishops, priests and formal worship were wholly unnecessary. Owing to his wide reputation for learning and piety, his opinions on these subjects influenced a great many people.

At first the pope, Adrian VI, did not regard the matter as of serious import; but at length, being convinced that Luther's influence was becoming dangerous, he urged the Diet of Nuremberg to institute determined action against him. The Diet, however, felt powerless to carry out the desire of the pope, because of the popularity of Luther with a number of the German princes. Frederick the Elector became his great patron. His writings were, however, condemned as heretical, and he himself, if he did not recant his errors in sixty days, was to be seized and sent to Rome to be tried for heresy. Luther publicly burned this communication. In 1521 Luther was summoned by Charles V to appear before the Diet of Worms and was called upon to recant his errors. Refusing to do so, he was conveyed privately to the Wartburg Castle by Frederick, elector of Saxony, where he lived in seclusion for a time and busied himself with the translation of the New Testament into German. On May 4, 1526, an alliance of the Protestant princes was formed at Torgau, under the leadership of John, the elector of Saxony, and Philip, the landgrave of Hesse. The Catholics formed a counter-alliance at Dessau, which emphasized a disunion that was destined to exercise an influence in every part of the world. The followers of Luther having become so numerous, Philip of Hesse convened a synod at Homburg in October, 1526, to systematize the doctrines and establish a rule of faith. A constitution was there formed which gave an individual congregation power to decide its own ecclesiastical rules. This was adopted in the several Lutheran states, in each of which the chief, or head, of the government was to be supreme in relation to the Church. To educate the younger element of the people, Luther wrote a catechism of a doctrinal character, which was extensively circulated. Because of a dread of Turkish power and a desire to allay, if possible, the dissensions which had arisen in relation to questions of an ecclesiastical character, a diet was held on April 19, 1529, at Spires. The Catholics submitted what they regarded as moderate claims. Against them the Lutherans protested, which was the origin of the name *Protestant*, that has since been applied to Lutherans and other dissenters from the doctrines of the Roman Church. In June, 1530, a diet was held at Augsburg, at which Emperor Charles V presided, and it demanded from the Protestant princes a written confession of faith. A confession, written by Melanchthon and approved by Luther, has since been known as the "Augsburg Confession." In 1555, in a diet at Augsburg, articles were framed giving each prince the right to choose between Lutheranism and Catholicism, the religion of the prince to be that of his people. Any prelate on becoming Protestant was to give up his benefice, and the subjects of ecclesiastical princes were to enjoy religious liberty. Thus the Lutherans first received legal recognition, but the issues between Catholics and Protestants were never satisfactorily adjusted until the Peace of Westphalia, which ended the Thirty Years' War, in 1648.

The doctrines of the German reformer found a willing adherent in Gustavus Vasa, who in 1523 became king of Sweden. Gustavus induced the estates of the realm, in the Diet of Westeräs (1527), to sanction the confiscation of the monasteries, and he declared himself supreme in matters ecclesiastical. The last remains of Catholic usages were abolished at a second Diet of Westeräs in 1544. The first systematic measures in favor of the Reformation in Denmark were taken by Frederick I, through the influence of his son Christian, who had studied in Germany and become an enthusiastic Lutheran. At a diet held in 1539, at which no member of the clergy was allowed to be present, the assembly decreed the abolition of the Roman Catholic worship in the Danish dominions. In Hungary, where numerous Germans had settled, bringing Lutheranism with them, the new faith for a short time made rapid progress, especially in the cities and among the nobles. In Poland the Reformation found numerous adherents, also. Both in Italy and in Spain, the idea of the Reformation at first gained some ground among scholars, but it never appealed at all to the masses of the people, and even among the scholars who were foremost in advocating certain reforms in the Church there was never any sympathy with the revolt against the papacy. After the Council of Trent and the subsequent Catholic Reformation, Protestantism practically disappeared from southern Europe.

In the Swiss states, the progress of Protestantism was of much more importance. It found a leader in Ulrich Zwingli, a preacher at Zürich, who, by sermons, pamphlets and public discussions, induced that city to abolish the old and inaugurate a new Reformed Church, a course followed by Bâle, Berne and other cities. Ultimately this movement was merged in political dissensions between the Reformed and the Roman Catholic cantons, and Zwingli himself fell in battle (1531). Between Luther and Zwingli there were differences of opinion, chiefly concerning the Lord's Supper, in which the former showed considerable ill-nature toward his fellow reformers. *The Institutes of Calvin* formulated the doctrines of a large body of Swiss Reformers, who also accepted Calvin's ordinances regarding Church discipline. After many tedious contests, Calvin's creed was virtually accepted in the Netherlands and elsewhere.

In France the movement seemed at first to find powerful support, as Margaret, queen of Navarre, sister of King Francis I, and many of the higher ecclesiastics favored the reformed doctrine. The New Testament was translated into French, churches to the number of 2000 were established by 1558, and the Huguenots, as the Protestants were called, formed a large religious party in the State. Unhappily, however, the religious element was mixed with political and personal hatreds, and in the civil strifes before and after the Massacre of Saint Bartholomew (1572) the religious movement declined. The giving up of Protestantism by Henry IV (1593) was a blow to the Huguenots, and though they obtained toleration and certain privileges by the Edict of Nantes, this was finally revoked in 1685.

The Reformation in England was only indirectly connected with the reform movement in Germany. Wycliffe and the Lollards, the revival of learning, the writings of More, Colet and Erasmus, the martyrdom of Thomas Bilney, had all combined to render the doctrine and discipline of the Church unpopular. This feeling was greatly increased when the writings of Luther and Tyndale's translation of the Bible found eager readers. The political element came to favor the popular reform movement when Henry VIII, in his efforts to obtain a divorce from Catharine, found it necessary to repudiate the papal supremacy and declare himself by act of Parliament (1534) the supreme head of the Church of England. To this the pope replied by threats of excommunication, which were not, however, immediately executed; yet the breach with Rome was complete, so far, at least, as the king was concerned. Under the new laws of supremacy and treason, several of the clergy suffered at Tyburn; Sir Thomas More and Fisher, bishop of Rochester, were beheaded at Tower Hill, and the lesser and greater monasteries were suppressed. At this time there were three chief parties in the State—the party which still held the pope to be the supreme head of the Church; the king's party, which rejected papal authority but retained the Roman Catholic faith, and the reform party, which rejected both the authority and the doctrine of the Roman Church. So far as Henry VIII himself was concerned, the changes made were not due to religious convictions, for in 1539 we find him passing the statute known as the *Six Articles*, which rendered it a penal offense to deny the doctrine of transsubstantiation or to affirm that priests might marry. Yet he allowed the publication of the *Litany* and some forms of prayer in English. With the accession of Edward VI, the Reformation movement made considerable progress. In 1549 the First Act of Uniformity enjoined on the Church the use of Cranmer's *First Book of Common Prayer*, and in 1551 the faith of the reformers was summed up in the *Forty-two Articles of Religion*, which in the reign of Elizabeth were reduced to the *Thirty-nine Articles of the Church of England*. They deny purgatory, reduce the original seven sacraments to two, endorse the Lutheran doctrine of justification by faith alone, repudiate papal jurisdiction and constitute the sovereign the supreme head of the Church. Thus, England in religion became detached from the see of Rome.

In Scotland the first great Protestant reformer was Patrick Hamilton, after whose death, in 1528, George Wishart took up the work and was followed by John Knox, who finally became the leading spirit of the Reformation in Scotland. By 1560 the new faith was firmly established in the country, episcopacy was abolished and the Reformed Church set up, differing in every respect as greatly as possible from the Church of Rome. The doctrines of the Church were formulated by Knox in a creed known as the *First Book of Discipline*, which was adopted by the General Assembly of the Church.

Thus Protestantism, the ultimate expression of the Reformation, took root permanently only in northern Europe, while Latin Europe, Italy, Spain, France and Austria, remained essentially Catholic countries. The effect of the Reformation in the Roman Catholic Church itself was on the whole good, for it compelled her attention to acknowledged abuses which greater vigilance and a more perfect supervision have now removed. See LUTHER, MARTIN

Reform' Schools, schools established for the training of juvenile offenders who have been convicted of crime. The first reformatory established under legislative control was the New York House of Refuge, established in New York in 1824. The success of this institution was so marked that other states followed New York's example, and now nearly all states have reform schools. The purposes of these schools are to prevent the young from being confined with older and hardened criminals, such as are found in jails and prisons, and to give a thorough education in the common branches and in manual training, including technical trades. The main object is to reform the inmates and prepare them to engage in some useful occupation. The time of detention varies in different states. In some of the older states a minor is required to remain until he becomes of age, while in other states, as Illinois, the length of the sentence depends upon the crime committed and the previous character of the individual.

Reformed Church, in general, those churches which arose at the time of the Reformation; specifically, Protestant churches which did not embrace the doctrines and discipline of Luther. The title was first assumed by the French Protestants, but afterward it became the common denomination of all the Calvinistic churches on the European continent. The Reformed Church of America is a body known up to 1867 as the Reformed Protestant Dutch Church, being founded by settlers from Holland, holding Calvinistic doctrines. As the original members spoke Dutch, this language was long used in public worship.

Refrac'tion, the bending of rays of light, caused by their passing through media of different density. A familiar instance of refraction is the broken appearance which a stick presents when thrust partly into clear water, the portion in the water apparently taking a different direction from the other portion. Glass, water and other solids and fluids each have a different power of refraction, and this power in each case may be expressed numerically by a number known as the *index of refraction*. *Atmospheric refraction* is the apparent angular elevation of the heavenly bodies above their true places, caused by the refraction of the rays of light in their passage through the earth's atmosphere, so that in consequence of this refraction the heavenly bodies appear higher than they really are. Atmospheric refraction is greatest when the body is on the horizon, and it diminishes all the way to the zenith, where it is nothing. See MIRAGE; POLARIZATION OF LIGHT.

Refrigeration, *re frij′ur a′shun,* the process of reducing temperature to the freezing point, or lower, by artificial means. The simplest refrigerating machines are porous jars with thin walls, used to keep water cool. The water oozes through the pores and evaporates on reaching the outer surface of the jar. The evaporation keeps the water cool.

Refrigeration on a large scale depends upon the principle that the expansion of liquid into a vapor is accompanied by the absorption of heat from surrounding objects. The necessary machinery consists of a pump, for compressing the liquid; a reservoir, into which this compressed liquid can be forced; coils of pipe, in which it will expand into vapor, and another system of pipes, for containing a liquid that can be reduced below the freezing point of water, without itself being frozen. Ether, sulphurous acid, carbonic acid and pure ammonia answer the purpose for the evaporating liquids, but ammonia, because it is less expensive than the others, is the liquid generally used. The ammonia gas is condensed by an air compressor, worked by a steam engine. This condensed gas is then driven through pipes that are cooled by running water to a temperature below 40°, which is the boiling point of ammonia. As the gas is cooled, it is liquefied. The liquefied ammonia is then allowed to evaporate rapidly, in contact with the objects to be cooled. The heat absorbed in this evaporation is withdrawn from the surrounding objects and reduces them to the desired temperature. In the cooling rooms of packing houses and large cold storage plants, the temperature is reduced by means of brine, flowing through pipes, which are evenly distributed about the room. The brine is first cooled by passing around coils of pipe in which the ammonia evaporates, then by means of pumps it is circulated through the pipes in the cold storage room. See COLD STORAGE; ICE, subhead *Manufacture of Ice.*

Regelation, *rej e la′shun,* refreezing, a name given to the phenomenon presented by two pieces of melting ice when brought into contact at a temperature above the freezing point. In such a case the pieces of ice freeze together. Not only does this occur in air, but also in water in such a temperature as 100° F. The phenomenon, first observed by Faraday, is of importance in the theory of glacial movement.

Regensburg, *ra′gens boorK.* See RATISBON.

Regent, *re′jent,* in a broad sense, a person who governs; specifically, one who governs during the minority, absence or disability of the king or queen. In most hereditary governments this office usually devolves upon the nearest relative of the sovereign capable of undertaking it; but this rule is subject to many limitations. In the English universities the name is given to members with peculiar duties of instruction or government. In many states of the Union the term is applied to officers having the direction of educational, benevolent and public institutions.

Regiment, *rej′i ment,* a body of regular soldiers, forming an administrative division of an army and consisting of one or more battalions of infantry or of several squadrons of cavalry, commanded by a colonel and other officers. A regiment is the largest permanent association of soldiers and is the third subdivision of an army corps, several regiments forming a brigade, and several brigades, a division. These combinations are temporary, while in the regiment the same officers serve continually and in command of the same body of men. The strength of a regiment may vary greatly, as each may comprise any number of battalions. In the United States army, an artillery regiment consists of twelve batteries and has 595 enlisted men; a cavalry regiment comprises twelve troops, each numbering seventy-eight privates; an infantry regiment contains ten companies, the number of privates varying from fifty to one hundred men in each company.

Regina, *re ji′na,* the capital of Saskatchewan, Canada, is situated on the Canadian Pacific, Grand Trunk Pacific and Canadian Northern railways. It is headquarters for supplies of one of the fertile districts of Canada and has a large wholesale trade. Population in 1909, 13,000.

Reg′ulus, MARCUS ATTILIUS, a Roman general who was made consul in 256 B. C., and was engaged in the first Punic War, during which he destroyed the Carthaginian fleet and landed his army in Africa. In the following year he was defeated and taken prisoner by the Carthaginians, and some years later he was sent to Rome by his captors to negotiate peace. He patriotically persuaded his countrymen to continue the war and, according to his oath, he returned to Carthage, where he died under torture. It is believed that the account of the embassy is entirely legendary.

Rehan, *re′an,* (formerly CREHAN), ADA (1860–), an American actress, born in Ireland. She was brought to the United States when but six years of age, and before she was fifteen she had appeared on the stage. She traveled, playing juvenile rôles, until 1879, when she became a member of Augustin Daly's company, of which she remained leading actress for twenty years. As Rosalind, in *As You Like It*; as Katharine, in *The Taming of the Shrew*; as Viola, in *Twelfth Night*; and as Lady Teazle, in *The School for Scandal*, she met with immense success in America and in England, where she has appeared several times. Among her other rôles are Portia; Maid Marion, from Tennyson's *Foresters*, and Roxane in *Cyrano de Bergerac.*

Reichstadt, *riKe'staht*, NAPOLEON FRANÇOIS JOSEPH BONAPARTE, Duke of (known as Napoleon II) (1811–1832), the only son of Napoleon I. On the first abdication of the emperor, Napoleon's wife, Maria Louisa of Austria, took the young son to Vienna, and when Napoleon I abdicated the second time, his son was named by him as his successor. The boy was never recognized, however. He never assumed the title of Napoleon II; but on the accession of his cousin, Louis Napoleon, in 1852, some title being necessary, the new emperor took that of Napoleon III, and the recognition of this by the governments of Europe implied the recognition of the former title.

Reichstag, *riKes'tahg,* (German *Reich*, a kingdom, and *Tag*, a day). See GERMANY, subhead *Government.*

Reid, *reed,* (THOMAS) MAYNE (1818–1883), a British story-writer, born in Ireland. His love of adventure brought him to America, where he traveled extensively as hunter and trader. He joined the United States army in 1845 and fought in the Mexican War. After his return to London, he became well known as a writer of thrilling juvenile stories, many of them based on his American experiences. His novels include *The Rifle Rangers, Scalp Hunters, The War Trail, The Headless Horseman* and *The Castaways.*

Reid, WHITELAW (1837–), an American journalist and diplomat, born at Xenia, Ohio. He graduated at Miami University in 1856, taught school for two years and then entered upon a journalistic career, becoming editor of the *News*, in his native town. During the Civil War he acted as special correspondent of the Cincinnati *Gazette.* In 1866 he became a planter in Louisiana, but two years later joined the staff of the New York *Tribune,* becoming editor in chief and proprietor in 1872, upon the death of Horace Greeley. In 1889 he was appointed United States minister to France by President Harrison, and was made the Republican nominee for vice-president in 1892. Reid was sent as special ambassador of the United States to Queen Victoria's Jubilee in 1897, was one of the American peace commissioners to Paris in 1898, represented the United States at the coronation of Edward VII in 1902 and three years later was appointed ambassador to England by President Roosevelt. He published many books and collections of essays and speeches and received honorary degrees from the University of the City of New York, Dartmouth, Miami, Princeton, Yale, Cambridge (England) and Saint Andrews (Scotland).

Reign of Terror. See TERROR, REIGN OF.

Reikjavik or **Reikiavik,** *rike'ya veek.* See REYKJAVIK.

Reims, *reems* or *raNs.* See RHEIMS.

Reindeer, *rain'deer,* a species of deer found in the northern parts of Europe and Asia. In North America the family is represented by the *caribou.* The reindeer is about four feet high at the shoulders and has a thick, square body; its legs are shorter, in proportion to its body, than those of the red deer. The size varies somewhat, according to climate, the reindeer of the Arctic regions being larger than those found farther south. The feet are large and broad and enable the animal to travel easily over the snow. The head carries a pair of large, branching antlers, which are shed each year. The reindeer is one of the most important domestic animals. It serves the inhabitants of the cold regions in northern Europe and Siberia as a beast of burden; it furnishes them with food and material for clothing and various household utensils. The animal is keen of sight and swift of foot and will maintain a speed of nine or ten miles an hour for a long time. It can easily draw a sledge with a weight of 200 pounds. The reindeer lives upon twigs, grass and lichens, which it secures by pushing the snow aside with its nose and fore feet. Since the settlement of Alaska the United States government has taken active measures to introduce the reindeer into that territory. (See illustration on next page.)

Rela'tionship. Personal and legal relationships are of two classes. Those of blood, that is, the relationship which exists between two persons descended from the same ancestor, known as *consanguinity,* and those of marriage, that is, the relationship which exists between the husband or wife and the kindred, by blood, of the other. This relationship is known as *affinity.* Consanguinity may be either *lineal* or *collateral,* the former existing between persons in the direct line of descent one from another;

the latter, between persons descended from a common ancestor, but not from one another. The wife's kindred by blood bear the same relation to the husband by affinity that they bear to her by consanguinity; thus, the wife's sister is said to be the sister-in-law of the husband. Relation by affinity disqualifies judges, jurors or witnesses, equally with relation by consanguinity.

Relief, *re leef′.* See Alto-Rilievo; Bas-Relief; Mezzo-Rilievo.

Religion, *re lij′un,* while difficult to define, may be said to be man's idea of an intelligent superhuman being and of the relation which he bears to this being. Religion is common to every race or tribe, even though some may seem not to possess it, because of their inability to tell of their faith or because they wilfully give a false answer. Even the books that teach the various religions show but a little, and this usually a modified phase, of the truths which the people accept and follow. Religions have been variously classified, but the classification of Jastrow seems to have fewer objections than the others. He makes four classes: (1) The religions of savages. (2) Religions of primitive culture, as those of Polynesia, Australia and the natives of Africa, Shamanism and the religions of Mexico and Peru. They include nature worship and ancestor worship; the priests are go-betweens between god and man. (3) Religions of advanced culture, as those of Egypt, Babylonia, Assyria, China, Greece and Rome. The priest becomes of less importance; mythology takes the place of magic and the belief that every inanimate thing has a soul; the influence of mythology itself is modified and diminished, as the people become more cultured. (4) "Those religions whose conscious ideal is the co-extensiveness of religion with life," that is, their being one, "complete harmony between the doctrines and the practices of religion." These religions make more prominent the spirit of man in relation to the divine, and they aspire to be world religions. They are Judaism, Buddhism, Zoroastrianism, Mohammedanism and Christianity.

Religions are sometimes divided into two great classes, polytheistic and monotheistic; that is, those recognizing a number of deities and those that recognize but one. The most remarkable religious conquests in history are those of Judaism, which established a national religion, originally that of a single family, in a hostile territory, by force of arms and expulsion or extinction of the previous inhabitants; Christianity, which, by the power of persuasion and in the midst of persecution, overthrew the polytheism of the most enlightened nations of antiquity; Mohammedanism, which, partly by persuasion, but more by force, established itself on the site of the Eastern Empire of Christianity and extended its sway over a population partly idolatrous and partly Christian; Buddhism, which, being expelled by persecution from India, spread itself also by moral suasion over the larger portion of Eastern Asia. All these religions, with the exception of Buddhism, which may perhaps be considered atheistic, are monotheistic systems.

REINDEER

Various estimates have been made of the number in the various religious creeds of the world. A recent estimate is the following: Roman Catholics, 230,866,533; Protestants, 143,000,000; Eastern Churches, 98,000,000; Mohammedans, 176,834,000; Buddhists, 147,900,000; Brahmanists, 175,000,000; followers of Confucius, 80,000,000; Shintoists, 14,000,000; Jews, 7,186,000.

Religious Liberty or **Liberty of Conscience,** the right of every man to form his religious opinions and to express the same in public worship, independently of the State. The limit of religious liberty is necessarily the right of the State to maintain order, prevent excesses and to guard against encroachments upon private right.

Among the nations of ancient times the idea of religious liberty was almost totally lacking, the individual being subject to the king in religious as well as in civil matters. During the early centuries of the Christian era the Christian religion was tolerated, and the first determined effort to exterminate it was made in the reign of Diocletian. Not until after the conversion of Emperor Constantine was full toleration of religious worship granted to all persons, and an edict soon followed, prohibiting the worship of heathen gods and establishing Christianity as the State religion of the Roman Empire. Until the Protestant Reformation, the question of religious liberty scarcely arose, because the authority of the Catholic Church was almost universally recognized throughout Europe. In fact, the Reformation itself did not introduce the principle into Europe, as every prince, whether Catholic or Protestant, believed that unity of faith among his subjects was essential to the integrity of the State. The American colonists brought with them some of the Old World ideas on this subject, but there was gradually developed in the new country a spirit of tolerance such as hitherto had existed in no land. The influence of the American idea of religious liberty has exerted a powerful influence in other countries, and to-day religious liberty practically exists in every part of the civilized world, though the old idea still holds sway occasionally and in certain places.

Rembrandt, *rem'brant,* the designation of Rembrandt Harmensz Van Rhyn (1606–1669), the most celebrated painter and etcher in the Dutch school, born at Leyden. After a few years of apprenticeship, in which from the first he showed originality and independence, Rembrandt moved to Amsterdam, where he spent the remainder of his life. His first work consisted of portraits, which were his chief source of income. Success was his from the start, and his paintings and etchings were soon in extraordinary demand. During the leisure he reserved, he painted biblical subjects, rendering them with realism and making them the motive for a fine arrangement of color and for a striking study of light and shadow, in the treatment of which he has seldom been surpassed. His works display profound knowledge of human nature, pathos, tragic power, humor and poetic feeling. His artistic development may be broadly divided into three periods. To the first of these (1637–1639), which shows less mastery than the succeeding two, belong his *Saint Paul, Samson in Prison, Simeon in the Temple, Lesson in Anatomy* and various character portraits of his wife, the poser of many an etching and picture, as *Queen Artemisia, Bathsheba* and *The Wife of Samson.* To his middle period (1640–1654) belong *The Night Watch, The Descent from the Cross, Portrait of Coppenol* and *Woman Bathing.* Among the works of his last period (1655–1668) may be mentioned *John the Baptist Preaching, Portrait of Jan Six* and *The Adoration of the Magi* and various portraits of himself. His etchings in technique and deep suggestion have not yet been equaled, and he was the first, and as yet the greatest, master of this department of art.

REMBRANDT

Though Rembrandt had made large sums of money, he had also spent it lavishly in the purchase of works of art, it is said, so that in his later years he lived in comparative poverty. Of his works there are about 280 paintings and 320 etchings extant, dating from 1625 to 1668.

Remenyi, *re mayn'ye,* EDOUARD (1830–1898), a Hungarian violinist. He received his musical education at the Conservatory of Vienna, but he was compelled to leave Austria on account of his complicity in the insurrection against Austrian rule. He made many tours through Europe and the United States and died in San Francisco. He possessed a marvelous technique and a true artistic instinct.

Rem'ington, FREDERIC (1861–), an American sculptor, painter and writer, born at Canton, N. Y., and educated at Yale Art School and in the Art Students' League, New York City. Afterwards he went west and lived upon a ranch, where he had opportunity to study the life and manners of the cowboys, soldiers and indians, subjects with which he has been especially successful as an artist. Among his statuettes are *The Bronco Buster* and *The Wounded Bunkie,* both executed in bronze with technical skill and feeling.

Rem'sen, IRA (1846–), an American chemist and educator, born in New York City. He was educated at Columbia College and studied abroad in the universities of Munich and Göttingen. He returned to the United States in 1872 and became professor of chemistry and physics in Williams College, Massachusetts. He went to Johns Hopkins when that institution was founded, in 1876, as professor of chemistry and organized the chemical department, so that it is now the best in the United States and among the best in the world. As a chemist he ranks second to none in the United States. He was elected president of Johns Hopkins University in 1901. Among the books which he has published are *Theoretical Chemistry, Organic Chemistry, Introduction to Chemistry* and *Elements of Chemistry*

Renaissance, *re nays'sans* or *ren na sahNs',* (French, "new birth") or **Revival of Learning,** the name given to the movement which produced the change from the methods and ideals of the Middle Ages to those of modern civilization. This change affected the attitude of men's minds toward art, literature, philosophy, the State, society and religion, and it consisted, chiefly, not in a difference in the things studied, but in the freer, more inquiring, more critical spirit in which these studies were approached. The old idea, that the destruction of Constantinople in 1453 and the consequent flow into western Europe of Greek manuscripts had come as a first gleam of light in the intellectual blackness supposed to represent medieval Europe, is entirely erroneous, and the Renaissance can be understood only when the fact is recognized that the Middle Ages had a civilization and culture of their own. This culture had been bound by tradition, it is true, and learning was the province, almost exclusively, of the clergy. These defects the Renaissance remedied, but it accepted and made a part of itself the best of the preceding civilization.

Renaissance Architecture. See ARCHITECTURE.

Renan, *re nahN',* ERNEST (1823–1892), a French orientalist, historian and essayist, born at Tréguier, in Brittany, and educated for the priesthood at the seminary of Saint Sulpice, Paris. In 1845, however, he gave up all intention of becoming a priest and devoted himself to historical and linguistic studies. In 1862 he was appointed professor of Hebrew, Chaldee and Syriac in the Collège de France, but the skeptical views manifested in his *Life of Jesus* raised an outcry against him, and he was removed from his chair, to be restored again, however, in 1871. This work, the publication of which caused intense excitement throughout Europe, was the first part of a comprehensive work on the *History of the Origins of Christianity. The Apostles, Saint Paul, The Christian Church, The Antichrist* and *Marcus Aurelius* were among the works which followed the *Life of Jesus.*

Reni, *ra'ne,* GUIDO. See GUIDO RENI.

Rennes, *ren,* a city of France, formerly capital of Brittany, at present capital of the Department of Ille-et-Vilaine, situated at the confluence of the rivers Ille and Vilaine. It is traversed from east to west by the Vilaine, which divides it into the "high" and the "low" town, and which is crossed by four bridges. The high town is handsome and regular, having been rebuilt after a dreadful conflagration which took place in 1720. The most remarkable buildings of the city are the cathedral, a modern Grecian building; the Palais de Justice; the Hôtel de Ville, and the Lycée. The manufactures include sailcloth, linen, shoes, hats and lace. Rennes is the seat of an archbishop and of a university, and it has a large arsenal and barracks. Population in 1901, 74,676.

Re′no, Nev., the county-seat of Washoe co., 31 mi. s. of Carson City, on the Truckee River and on the Southern Pacific, the Virginia & Truckee and the Nevada, California & Oregon railroads. It is in a farming, mining and stock-raising section, and it is the largest city and the most important business and industrial center in the state. The principal establishments are railroad shops, a packing house, an electrical power plant, brick works and other factories. It is the seat of the state university and of the state agricultural college and experiment station. The city also has a normal school, an academy, a Carnegie library and three banks. Reno was settled in 1858, was incorporated in 1869 and was chartered as a city in 1901. Population in 1900, 4500.

Rensselaer, *ren′se lur,* N. Y., a city in Rensselaer co., on the Hudson River, opposite Albany, and on the New York Central, the Boston & Albany and other railroads. It is in an agricultural and dairying region and has railroad shops and manufactures of felt, leather, tools, lumber products and other articles. The settlement was incoporated as a village in 1815 and was known as Greenbush until its incorporation as the city of Rensselaer in 1897. Population in 1905, 10,715.

Rent. Francis A. Walker has defined rent as "the term applied to the remuneration received by the landowning class for the use of the native and indestructible powers of the soil or for the use of natural agents." This defines rent in the economic sense. Its common significance will be discussed below.

The origin of rent may be illustrated by the following example: If there were an illimitable amount of land of even quality, evidently no basis for rent would exist, since any man could apply himself to land freely. If, however, the amount of land of the first quality was limited, that is, was not equal to the demands of the whole community, so that, in order to secure support, some members of the community would be compelled to resort to lands of lower quality, the owners of the lands of first quality would evidently be enabled to demand a compensation for the use of their land, since men would be willing to pay for the use of better land, rather than go to poorer land, where the same amount of labor would not create equal product. If, by reason of increase of population or the monopolization of land by any means, the community is compelled to cultivate poorer and poorer qualities of land, evidently the price which the owners of the land of first quality can command for the use of their land will constantly increase, and, accordingly, lands of poorer and poorer quality will be able to command rent. This leads to the so-called *law of rent,* to which the name of Ricardo has been attached, because he was the first to give it a lucid and logical explanation. It is as follows: The rent of land arises from the difference in the productivity of lands which are of necessity cultivated for the support of the community. This rent will be exactly equivalent to this difference in productivity; that is, if one section can produce twenty-four bushels of wheat to the acre, and another section, which must be cultivated, produces but twenty bushels to the acre, the owner of the first section can command for the use of his land four bushels out of the product of each acre each year.

The word *productivity* in this sense does not refer only to agricultural product, but to the use of land or of any natural agent in any capacity, such as the use of land as building sites, the use of water or the use of land for pasturage. The compensation which can be commanded for any of these employments is in the economic sense as much rent as if the land were to be cultivated. Moreover, the act of production begins when the first labor is exerted and does not cease until the product has been delivered to market; thus, the productivity of land is as much dependent upon its location—that is, ease of access and distance from market—as upon its natural fertility. In fact, in modern times the value of lands devoted to purposes other than agricultural far exceeds that of farming lands, in almost every community. Thus, it happens that land-owners are able to hold land until the natural progress of the community, in population, wealth and growing diversity of interests, gives a largely increased value to their property. Without contributing anything in the form of labor or other output, they reap a reward created by the whole community. This is the so-called "unearned increment of land." For the reason that this increment is unearned, and, further, because land and all natural opportunities seem to be the gift of the Creator to the community at large or to all men in common, a large class of modern economists have declared the private ownership of land to be unjust and intolerable, and various methods have been proposed for doing away with the system. Among these, the advocates of the nationalization of land have attained a large following, especially in England and some other European countries, while those who would confiscate ground rents by exempting all personal property from taxation and concentrating taxation upon land values, irrespective of improvements, have of late years, under the leadership of Henry George and his followers, gained a strong foothold in the United States (See SINGLE TAX).

The term *rent* in common usage is applied to the compensation paid by a tenant to his landlord, who may be the owner both of the land and of improvements thereon, such as buildings, fences and crops; but from the standpoint of political economy the term is misused in this sense, since the compensation which the landlord receives for all improvements is in reality but a return upon the capital invested and is in no sense the natural product of land. For the legal principles governing relations between landlord and tenant, see TENANT; LEASE.

Ren'wick, JAMES (1790–1863), a Scotch-American scientist, born in Liverpool. He was educated at Columbia College, New York, and later became professor of physics and chemistry in that institution. He wrote a number of works connected with the sciences in which he taught, such as *Outlines of Natural Philosophy*, *Treatise on the Steam Engine* and *Elements of Mechanics*; also a *Life of John Jay*, a *Life of Alexander Hamilton* and a *Life of De Witt Clinton*.

Replev'in. See WRIT.

Rep'plier, AGNES (1855–), an American essayist, of French extraction, born at Philadelphia. She received her education at the Sacred Heart Convent at Torresdale, Pa., and at the University of Pennsylvania. Much of her time has been spent in travels, which she has described delightfully in numerous essays. Her books include *Books and Men*, *Points of View*, *Essays in Idleness*, *The Fireside Sphinx* and *In Our Convent Days*. The lightness of her touch and her humorous point of view make her sketches very entertaining reading.

Represent'ative Government. See GOVERNMENT; REPUBLIC.

Reprieve, *re preev'*, the suspension of the execution of the sentence passed upon a criminal for a capital offense. A reprieve may be granted in various ways: First, by the mere pleasure of the executive; second, when the judge is not satisfied with the verdict, or any favorable circumstance appears in the criminal's character; third, when a woman capitally convicted pleads pregnancy, and lastly, when the criminal becomes insane.

Reptiles, *rep'tilz*, a class of vertebrate animals, differing widely in appearance, but having their most important characteristics in common. They resemble, too, the birds, in many respects that do not show upon the surface. The young, in nearly all species, when born from the eggs, are like their parents, except in size and in some minor respects. The bodies of all are covered with hard skins or bony plates or shells. They breathe through their lungs throughout the whole period of existence. Geology shows that at one time the earth was inhabited by many species of gigantic and terrifying reptiles which have long since ceased to exist, and in general the class may be said to be disappearing. See ALLIGATOR; LIZARD; SNAKE; TURTLE, and a number of articles on other species.

Repub'lic, a government in which the supreme power is vested in officers chosen by, and responsible to, qualified electors. According to the constitution of the electing body and of the governing class, the essential form of a republic may therefore vary from the proudest aristocracy to the most complete democracy. In the small states of ancient Greece the supreme power was vested in the whole body of the citizens, who met in common assembly to enact their laws. In the oligarchic republics of Genoa and Venice the supreme power was assigned to the nobles or to a few privileged individuals. In all modern republics the representative system prevails, the right of suffrage being liberally granted, but the duties of administration being confined to a chosen few. Besides the diminutive republics of San Marino, in Italy, and Andorra, on the south side of the Pyrenees, the only republics in Europe at the present day are those of Switzerland and France. Switzerland has been a republic ever since it liberated itself from German rule; and France has been thrice a republic—from 1793 to 1804, from 1848 to 1852 and from 1870 to the present time. Holland was a republic from the separation of the seven provinces from Spain until 1815; Great Britain was nominally a republic from 1649 to 1660; Spain possessed a republican government in 1868–1869 and in 1873–1874.

In the Western Hemisphere the republican form of government prevails among most independent states. The United States is a federal republic, consisting of a number of separate states united, by a constitution, under a central government, with power to enact laws binding on all the citizens. Mexico has been a republic since 1824, except during the short-lived empire, from 1863 to 1867. Brazil has been a republic since November, 1889, and Cuba is the latest to join the family of republican states (1902).

Republic, GRAND ARMY OF THE. See GRAND ARMY OF THE REPUBLIC.

Republican Party, the name given to two political parties in American history. The first, known at different times as the Anti-Federalist, Democratic-Republican and Republican party, came into power in 1801, when it elected Jefferson, and retained its hold upon the government almost continuously for more than sixty years. Meanwhile, its name had been changed to the Democratic party, the title which it still retains.

The second was organized in 1856, being the lineal successor of the Whig, National Republican and Federalist parties. It was organized on the basis of opposition to the growth of slavery, by the coalition of several factions, including the Know-Nothings, the Free-Soilers, the Abolitionists, the Anti-slavery Whigs and the Anti-slavery Democrats. Its first candidate for the presidency was John C. Fremont, who was defeated in 1856 by James Buchanan; but the party grew rapidly and, profiting by a division in the Democratic ranks, elected Abraham Lincoln president in 1860, thus hastening the slavery crisis and the Civil War. From that time on for nearly fifty years it was continuously in power, with the exception of the two administrations beginning in 1884 and in 1892. For a detailed history of this party and its relation to other political organizations, see POLITICAL PARTIES IN THE UNITED STATES; UNITED STATES, subhead *History*.

Repu′dia′tion, a refusal on the part of a government to pay the debts contracted by the governments which have preceded it. Repudiation has sometimes been resorted to by the smaller American republics and occasionally by states of the Union. It is frequently practiced by pretended or revolutionary governments which have no permanent existence.

Resaca de la Palma, *re sah′ka dai la pahl′ma,* BATTLE OF, a short, but severe, engagement in the Mexican War, fought May 9, 1846, between a force of 5000 Mexicans, under General Arista, and about 2300 Americans, under General Taylor. The battle took place in a ravine in Cameron County, Texas, and resulted in a fearful loss, placed by some authorities as high as one-seventh of the total force engaged. The Mexicans were finally defeated.

Reservoir, *rez′ur vwor,* an artificial basin in which a large quantity of water is stored. The construction of a reservoir often requires great engineering skill. In the selection of a site the great object should be to choose a position which will give the means for collecting a large supply of rainfall with as little recourse as possible to artificial structures or excavations. The embankments or dams may be constructed either of masonry or earthwork, but the latter is the more usual, as it is generally the more economical method. Reservoirs in which the dams are built of earthwork must be provided with a waste-weir, to admit of the surplus water flowing over; in the reservoirs of which the dams are built of masonry there is no necessity for a waste-weir, as then the water may be allowed to overflow the wall, there being no fear of its endangering the works. The outlet at the bottom, by which the water to be used is drawn off from the reservoir, may consist either of a tunnel, a culvert or iron pipes provided with suitable sluices. The largest reservoirs are connected with city waterworks and irrigation projects. See IRRIGATION; WATERWORKS.

Resins, *rez′inz,* a class of vegetable substances, insoluble in water, soluble in alcohol and easily softened or melted by heat. Resins are transparent or translucent, have generally a yellow-brown color and are sometimes elastic, but more generally friable and hard. They become electrified when rubbed. Resins may be divided into three classes: (1) Those which exude spontaneously from plants or from incisions in the stems and branches. They are generally mixtures of gum resins and volatile oils. The principal resins belonging to this class are benzoin, dragon's blood, Peru balsam, storax, copaiba, copal, lac, myrrh and turpentine. (2) Resins extracted from plants by alcohols; they generally contain definite carbon compounds. The principal resins belonging to this class are gum ammoniacum, angelica root, Indian hemp, cubebs, manna and squill. (3) Fossil resins, occurring in coal or lignite beds, amber, asphalt, copaline and fossil caoutchouc. See TURPENTINE.

Resolu′tions of 1798. See KENTUCKY AND VIRGINIA RESOLUTIONS.

Res′pira′tion, a physiological function, consisting of the alternate expansion and contraction of the chest, by means of which air is brought into the lungs, an act known as *inspiration,* and expelled from them, an act known as *expiration.* During inspiration the diaphragm, which is a flattened dome when at rest, contracts to a flat surface, thus enlarging the chest vertically; the ribs, the greater number of which are attached very obliquely to the spine and sternum, are raised both at the front and the sides, thus enlarging the *diameters* of the chest. The muscles that accomplish this result are the *scaleni,* which by their contraction hold the first and second ribs at a fixed point, while the external, and a part of the internal, intercostal muscles raise the other ribs. The chest cavity having been enlarged, the pressure of the air in the lungs forces them into the increased space, and air rushes in to fill the enlarged air cells. This ends the act of inspiration. Expiration is a purely passive act, the result of the recoil of the elastic tissues of the thoracic and abdominal walls and of the lungs and the returning to position of ribs and diaphragm.

The objects of respiration are to supply the oxygen necessary for the body and to carry off the carbon dioxide which has been produced in the various changes that take place in the organs. The quantity of air that is uniformly changed in each act of respiration is called *breathing,* or *tidal,* air, which in man is from twenty to thirty cubic inches. The quantity which can be taken in over and above the thirty cubic inches is called *complemental air* and is usually about one hundred cubic inches. The amount that can be forcibly expelled more than the thirty cubic inches of tidal air is about one hundred cubic inches, and is known as *reserve air.* The quantity which cannot be expelled, but remains in the lungs, known as *residual air,* is about one hundred cubic inches. About 686,000 cubic inches pass into and out of the lungs of an adult every twenty-four hours. The amount may be increased for a hard-working man to over one and a half million cubic inches. The proportion of respiration movements to heart-beats is about one to four or five. The air, in passing through the lungs, gives up oxygen to the blood and takes, in exchange, carbon dioxide, this exchange taking place in the capillaries of the lungs. The amount of this gas carried out varies with the temperature and moisture of the air, age, sex, muscular development, the nature and quantity of food muscular exercise, sleep and state of health. It is increased by external cold, moisture, eating and muscular exertion; it increases in both sexes to about the thirtieth year, and it is greater in robust than in slender men. It is diminished by heat, by sleep, in certain fevers, as typhus, and in chronic diseases of the respiratory organs. See ASPHYXIA; CIRCULATION; HEATING AND VENTILATION; AUSCULTATION; PERCUSSION.

Restigouche, *res te goosh',* a river which separates New Brunswick from the Province of Quebec, flowing northeast into the Bay of Chaleurs. It is 200 miles long, is navigable for 118 miles, to Campbelltown, and forms a tidal estuary for 24 miles. It drains 4000 square miles, and its basin supplies great quantities of timber.

Resump'tion of Specie Payments. See SPECIE PAYMENTS, RESUMPTION OF.

Resurrection, *rez'ur rek'shun,* the rising again of man after death, to be possessed of all powers and faculties. It has formed a part of the belief of the Christian Church since its first formation and has been embodied as an article in each of the creeds. The foundation of the belief in resurrection is the resurrection of Christ from the dead, the corner-stone of the Christian system. The evidence in support of it is marked by the following characteristics: (1) The variety of circumstances under which the risen Savior appeared; (2) the circumstantiality of the testimony given by the different witnesses; (3) the simplicity and apparent truthfulness with which the witnesses describe their impressions when the Savior appeared to them; (4) the unexpectedness of the event, to those who bore witness to it; (5) the promptness with which the testimony was published to the world on the very spot where, and at the very moment when, the event was said to have happened.

Various attempts have been made to explain away the resurrection of Christ. There is the supposition, (1) of fraud; that, according to the statement of the Jews, the disciples stole the body and then published the story that their Lord was risen; (2) that Jesus had not really died on the cross; that His apparent death was only a swoon, from which He afterward recovered; (3) that there had been no real resurrection, but that the disciples had been deceived by visionary appearances or hallucinations; (4) that the assertion of the resurrection was originally allegorical. With regard to the significance of Christ's resurrection, to Christians it is the crowning evidence of the divine character of His mission.

Resurrection Plant. See JERICHO ROSE.

Reszke, *resh'ke,* EDOUARD DE. See DE RESZKE, EDOUARD.

Reszke, JEAN DE. See DE RESZKE, JEAN.

Retain'er, in law, the act of a client by which he engages an attorney or counselor to manage a case at law. The effect of a retainer is to confer on the attorney all the powers involved in the forms and usages of the court in which the suit is pending. It is *special* when given for the purpose of securing the counsel's services for the particular case; *general*, when for securing his services generally. The retainer is in all cases accompanied by a preliminary fee, called a *retaining fee*, or *retainer*.

Retirement, in the army and navy, withdrawment from the service, with the retention of pay or a portion of the pay. In the United States, army and navy officers are retired after forty years' service, or at sixty-two years of age, as the case may be. Thereafter they receive 75 per cent of the pay of the office they held at the time of retirement.

Retriever, *re tree'vur*, a dog specially trained to fetch game which has been shot; it is greatly valued by sportsmen for its intelligence in the field and in the water. The larger and more familiar breed of retrievers is a cross between the Newfoundland and the setter; the smaller breed is a cross between the water spaniel and the terrier. The typical retriever is twenty or more inches high, with a stoutly built body, strong limbs, webbed toes and black and curly hair. The American retriever, commonly known as the Chesapeake Bay dog, is the best known. He is very keen of scent and is an excellent swimmer.

Reunion, *ra u nyohN'*, formerly Bourbon, an island in the Indian Ocean, between Mauritius and Madagascar. Its area is 790 square miles. It is very mountainous, the Piton des Neiges reaching a height of 10,070 feet, and the Piton de la Fournaise, an active volcano, being 8713 feet high. The soil produces tropical products, sugar being the principal crop. Coffee, cloves and vanilla are also grown. Destructive hurricanes are frequent. The population, which consists of creoles, negroes, Indian coolies, Chinese, Malays and whites, is 173,315.

Rev'al (Russian, *Revel*), a fortified seaport of Russia, capital of Esthonia, on a small bay of the Gulf of Finland. It contains several ancient churches, a fine modern church, a cathedral, and many interesting antiquities. Its manufactures are unimportant, but its trade is large, the exports including grain, flax and spirits, and the imports, coal, iron, cotton, tea, wine and chemicals. Population, 64,578.

Rev'ela'tion of Saint John, a name given to the last book of the New Testament in the English Bible. The authorship of the book is uncertain, as is also the date of composition, and no other book in the Bible has been the subject of more frequent or heated controversy. It was probably written in opposition to the persecution practiced by the Roman Empire and to urge Christians under Roman dominion to resist the spread of emperor-worship, which in the first two or three centuries of the Christian era gained wide prevalence. The book opens with seven letters to seven Christian churches in the East; then follows a series of visions of the final judgment and prophecies as to the overcoming of evil (the influence of the Roman Empire) by the forces of good (Christianity). It predicts this event for the near future.

Revere', *re veer'*, MASS., a town in Suffolk co., 5 mi. n. e. of Boston, on the Atlantic coast and on the Boston & Maine and the Boston, Revere Beach & Lynn railroads. It is a residence place and a popular summer resort. It has a Carnegie library, a public bathhouse, built and maintained by the state, and a town hall, which is a memorial to Paul Revere, in whose honor the town was named. The place was settled about 1626 and was known as Rumney Marsh, but remained a part of Boston until its incorporation as Chelsea in 1739. It was set off as North Chelsea in 1846 and was given its present name in 1871. Population in 1905, including three villages, 12,659.

Revere, PAUL (1735–1818), an American patriot, born at Boston, Mass. He earned fame by riding from Boston to Lexington on the night of April 18, 1775, to give warning of the British expedition, which was resisted next day at Lexington and Concord. This deed is the subject of Longfellow's poem, *The Midnight Ride of Paul Revere*.

Revi'val, a term popularly used among Protestants to denote periods of extensive spiritual awakening in a church or community, when professed Christians renew their vows and other persons for the first time openly confess their faith. The term revival is more rarely applied to various important religious movements of the past, like those of monastic orders in some periods of their history or of the Crusaders or the Wycliffites in England and the Hussites in Bohemia.

As early as the sixteenth century there were Protestant revivals in Scotland, under Wishart, Cooper and Welsh, and again, both there and in Ireland, about a generation later, under Bruce and Livingston; but such revivals have flourished most in England and America. The first great revival in England occurred under the preaching of John Wesley and George Whitefield, early in the eighteenth century, and resulted in the forming of the Methodist churches. Under the vigorous preaching of Jonathan Edwards, at Northampton, a revival had spread throughout a large part of New England, and Whitefield, a preacher of singular power and inexhaustible energy, came to America and followed up the work of Edwards, preaching in the open air to great audiences and winning many hundreds of converts. This revival movement, known as the "Great Awakening," occupied the years 1740 to 1742 and extended throughout almost all the colonies. One result of the awakening between 1740 and 1760 was the establishing of 150 new churches in New England and the arousing of a new interest in education, which resulted in the founding of Princeton and Dartmouth colleges.

Toward the end of the eighteenth century, a fresh series of revivals began, spreading through the itinerant preachers to the new Western settlements. Among the prominent leaders was Charles G. Finney. A feature inaugurated in the South about 1800 was the camp meeting, a great open-air assembly, lasting for days or weeks and characterized by religious services every evening and the greater part of the day. The Chautauqua assembly, a highly successful educational enterprise, is a development of the camp meeting idea. One of the most remarkable of all religious revivals swept over the whole country from 1858 to 1859. The latest series of great revivals occurred in 1875 to 1876, under the preaching and singing of Moody and Sankey, the most renowned evangelists of the nineteenth century.

Catholics employ what they designate as *missions*, to perpetuate religious fervor. These missions are almost wholly conducted by the regular orders of the Church, such as the Jesuits, Franciscans, Dominicans and Paulists. To such work the ablest and most eloquent of the order are assigned, who conduct their work in churches for two weeks, one of which is devoted to men and the other to women. They are characterized by morning and evening devotions and lectures, and prior to their close the attendants receive the sacraments of penance and the eucharist. These missions are supposed to renew activity in spiritual exercise and may not unjustly be regarded as revivals.

Rev′olu′tion, any extensive and sudden change in the constitution of a country. The most important events in modern history specifically known under this name are the English Revolution of 1689; the American Revolution of 1776; the French Revolution of 1789; the Revolution of 1830 in France (the "July Revolution"), which deposed Charles X and raised Louis Philippe to power; the Revolution of 1848, which established the Second Republic, and the revolutions by which the existing South American republics were established or are from time to time modified. The revolutionary period *par excellence* consisted of the years 1848 and 1849. The French change of constitution in 1871 is not usually spoken of as a revolution, though in effect it was one.

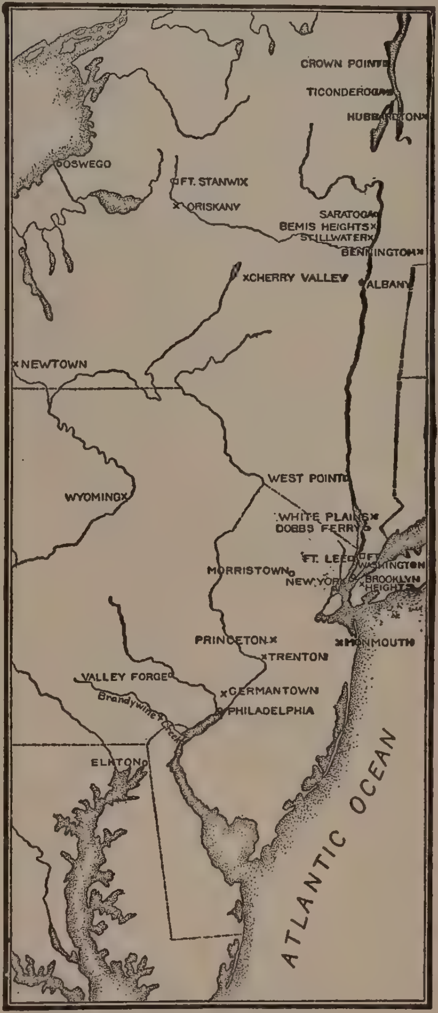
Rev′olu′tiona′ry War in America, the name commonly given to the struggle by which the thirteen English colonies in America achieved their independence. The causes which led to that war were many, but all were due to an unfortunate policy of colonial administration on the part of the British government. This policy may be characterized as an intention to exploit the colonies for the benefit of the mother country. It took the form of restrictions upon commerce (See NAVIGATION ACTS); of taxation for the purpose of supporting administrative policies in which the colonists had no voice; the establishment of a standing army in America, partly for the defense of the colonies and partly for the repression of the spirit of independence and democracy, all culminating in measures which were coercive and unconstitutional. (For a more detailed statement of the causes of the war and its early events, see UNITED STATES, subhead *History*, sub-subhead *Causes and Beginnings of the Revolutionary War*.) This article aims to give only an outline of the chief military events of the war. Consult articles upon the separate battles and the leading soldiers and statesmen of the period.

From a military standpoint, the war may be divided into four periods, the first coinciding roughly with the period of political agitation, and including such events as the Boston Massacre (See BOSTON MASSACRE), March 5, 1770; the destruction of the *Gaspee*, June, 1772, and the Boston Tea Party (See BOSTON TEA PARTY), December 17, 1773. The second period, which may be known as the era of independence, began with the assembling of the provincial congress in Massachusetts, October, 1774, its first military event being the battles of Lexington and Concord (April 18 and 19, 1775), and the beginning of the siege of Boston, on the latter date. On May 10 the colonial force, consisting of Green Mountain Boys (See GREEN MOUNTAIN

BOYS) under the command of Ethan Allen, and regulars under Benedict Arnold, captured Ticonderoga, and a little later, Crown Point. The Battle of Bunker Hill, on June 17, though won by the British, cost them so heavily that it amounted to an American victory and was the first important engagement of the war. In the fall of 1775 one of the most brilliant expeditions of the war was undertaken, an invasion of Canada. One force under General Robert Montgomery proceeded from Ticonderoga, captured Saint John's after a siege of fifty days and gained control of Montreal. Another force under Benedict Arnold started through the Maine woods to assist Montgomery in capturing Quebec. The final assault was upon the last day of the year, but it failed, Montgomery being killed and Arnold severely wounded, and the Americans were forced to retire to Crown Point. Boston fell into the hands of the Americans in March, 1776, and the English withdrew, first to Halifax and then to the vicinity of New York City.

From this time three separate military movements on the part of the British were begun, namely, the capture of Philadelphia, the capital of the United States; the isolation of New England by the control of the Hudson Valley, and the invasion of the Southern colonies, which were supposed to be loyal. The third plan was attempted first, under the leadership of General Clinton, with the aid of a fleet, but it met with a disastrous termination, when an attack upon Charleston, S. C., was repulsed by an American force in Fort Moultrie (June 28). The second period of the war closed with the Declaration of Independence (See DECLARATION OF INDEPENDENCE), July 4, 1776.

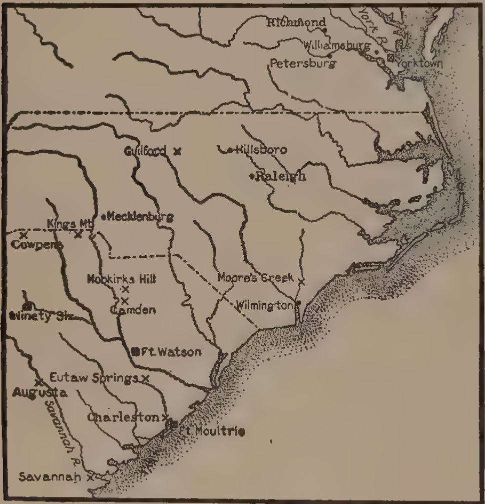
The third period, which may be known as the period of suspense, was ushered in by the Battle of Long Island, August 27, and the British capture of New York City, September 15. A few months later forts Washington and Lee both fell into the hands of the British, and the Americans were compelled to retreat southward, hard pressed by General Howe, who aimed to take Philadelphia. This retreat upon the part of the Americans disclosed the remarkable military genius of General Washington and was once called by Frederick the Great the most brilliant campaign of this military century. It culminated in two notable victories, one at Trenton, in which Washington completely surprised a troop of Hessians in the midst of Christmas night carousals and captured the whole force, and one at Princeton, January 3, 1777, by which he compelled the British practically to abandon the whole State of New Jersey. During this winter, Lafayette, Baron De Kalb, Kosciusko and Pulaski arrived in America with a French force, which was to be of great service to the Americans in the pending campaigns.



THE WAR IN THE MIDDLE STATES
A cross indicates a battle; a square, a fort; a circle, an important town.

In the succeeding fall the British began their campaign for the capture of the Hudson River Valley. Burgoyne, with a force of 10,000 men, was to approach from Canada by way of Lake Champlain; Howe, with about an equal force, was to ascend the Hudson River from New York, and Saint Leger, also with about 10,000, was to descend the Mohawk Valley. Burgoyne's campaign began with a series of unimportant victories, including the capture of Ticonderoga and Crown Point, but he lost a seventh of his force at the Battle of Bennington, August 17, 1777, and was finally compelled to surrender after two serious battles near Saratoga, September 19 and October 7, the formal capitulation taking place on October 17. Meanwhile, Saint Leger encountered serious obstacles and was finally defeated at Oriskany, August 6, and compelled to retreat to Canada. Howe, meantime, had been lured from his purpose by the attractive program of capturing the rebel capital at Philadelphia and had abandoned the forces of Saint Leger and Burgoyne to their fate and begun his famous invasion of New Jersey. By defeating the Americans at Brandywine Creek (September 11), he was able to enter Philadelphia, leaving part of his force at Germantown. The Americans advanced to attack this division October 4, but failed, chiefly through an accident, and retired to Valley Forge (See VALLEY FORGE), where they spent the winter amid the greatest suffering.

In the following spring began the last period of the war, including five separate campaigns—(1) the operations in New Jersey; (2) the siege of Newport; (3) the war on the frontier; (4) the Hudson Valley campaign, and (5) the second invasion of the South. The Americans received the news of the French alliance early in the spring and were also strengthened by a fleet and land force sent by France. Philadelphia was evacuated by the British, June 18, and this was followed by the disastrous Battle of Monmouth ten days later, the British retiring to New York City. The Hudson Valley campaign began with the storming of Stony Point, May 31, 1779, and again July 16, but this success was somewhat clouded by the treason of Benedict Arnold in the fall of the same year. In the South the really crucial campaign of the war was fought out, its important engagements being at Brier Creek, March 5, 1779; the capture of Charleston by the British, May 12, 1780; the defeat of General Gates at Camden, August 10, and important American victories at King's Mountain, October 7, at the Cowpens, January 17, 1781, at Guilford Court House, March 15, and at Eutaw Springs, September 8. This campaign, though at first a failure, through blunders by General Gates, was brought to successful completion by General Nathaniel Greene, who finally drove the English army under Cornwallis into Virginia. Washington thereupon transferred a large part of his force from the Hudson River Valley to the vicinity of Yorktown, a distance of 400 miles, and there, with the coöperation of the French fleet and the French army, compelled the surrender of Cornwallis, October 19, 1781. The siege of Newport, in which the French and Americans were also allied, resulted in the complete defeat of the American plans, and the city remained in the hands of the British.



THE WAR IN THE SOUTH
A cross indicates a battle; a square, a fort; a circle, an important town.

On the frontier, the war which had begun with the fearful massacre in the Wyoming Valley (See WYOMING VALLEY MASSACRE), was completed by the Battle of New Town, between a force under General Sullivan and a company of British and indians, the former being entirely successful. Meantime, George Rogers Clark had taken Vincennes and established the authority of the colonies in the Northwest Territory. The only important naval battle of the war was that between the *Bon Homme Richard* (See BON HOMME RICHARD), the flagship of John Paul Jones, and the *Serapis*, on September 3, 1779. It was a brilliant victory for the Americans and one of the most important sea battles in modern history.

The British king and ministry reluctantly agreed to make peace, the treaty being signed at Paris, September 3, 1783. The treaty recognized the independence of the United States and established the boundaries of the new nation at the Mississippi River on the west, the Great Lakes and Saint Lawrence River on the northwest, an arbitrary boundary at about 45° north latitude on the north and the northern boundary of Florida on the south. It also made provision for the evacuation of western posts by the British, for the payment of war claims to the Tories and for the settlement of other minor questions. Consult Lecky's *The American Revolution* and Fiske's *The American Revolution.*

Revol'ver, a firearm in which a number of charges, contained in a revolving cylinder, are, by pulling the trigger, brought successively into position and fired through a single barrel. For the revolver in its present form we are indebted to Col. Samuel Colt, though repeating pistols had long been known. These were made from one mass of metal, bored into the requisite number of barrels, but were so clumsy as to be almost useless. In Colt's weapon there is a revolving cylinder containing six chambers, placed at the base of the barrel. The cylinders contain the cartridges, which are put in from the front of the breech-piece. The revolver is fired through the single barrel, the cylinder being turned by mechanism connected with the lock, until each chamber in succession is brought round so as to form virtually a continuation of the barrel. Various modifications of Colt's revolver have been introduced, with the view in some cases of increasing the rapidity and facility of firing, in others of diminishing by safeguards the risks to which inexperienced hands must ever be exposed in the use of these weapons. In the latest form of this revolver the spent cartridges are thrown out of the cylinder by means of an automatic discharger. As a military weapon the revolver is being superseded by a repeating pistol, with mechanism similar to that of magazine rifles. The revolver principle has also been applied to rifles and to guns for throwing small projectiles, as in the Gatling and other machine guns.

Reykjavik, Reikjavik or **Reikiavik,** *rike' ya veek,* the capital of Iceland, situated on the southwest coast of the island, on the Kollafjord. It is an unsubstantial town, containing chiefly wooden buildings. It is the seat of a bishop, and its principal institutions are a college, a gymnasium, several professional schools, an observatory and a library. Population in 1901, 6682.

Reynolds, *ren'oldz,* JOHN FULTON (1820–1863), an American soldier, born at Lancaster, Pa. He graduated at West Point in 1841, entered the artillery service and took part in the Mexican War. At the outbreak of the Civil War he resigned a position as commandant at West Point to accept an appointment as brigadier general of volunteers. He took part in the Peninsula and Northern Virginia campaigns, and in November, 1862, became major general of volunteers, with command of a corps in the Army of the Potomac. He fought at Fredericksburg and was in chief command of the Federals at Gettysburg during the forenoon of July 1. He was killed by a Confederate sharpshooter about noon of the same day.

Reynolds, JOSHUA, Sir (1723–1792), an English portrait painter, born at Plympton, Devonshire. Through the kindness of Captain (afterward Admiral) Keppel, he was enabled to visit Italy, where he studied three years. Returning to London in 1753, and finding generous patrons in Admiral Keppel and Lord Edgecombe, his studio was thronged with the wealth and fashion of the metropolis, and the most famous men and the fairest women of the time were among his sitters, so that he rapidly acquired wealth and became the most fashionable painter, not only in England, but in all Europe. Among the more notable of his portraits are the duchess of Hamilton, the duke of Cumberland, Miss Palmer, Mrs. Nesbit as Circe, Mrs. Siddons as the Tragic Muse, the duchess of Devonshire and child and Miss Gwatkin as Simplicity. In 1768, on the foundation of the Royal Academy, he was chosen president, directly after received the honor of knighthood and in 1784 was appointed principal portrait painter to the king. As president of the Royal Academy he delivered his celebrated annual *Discourses on Painting,* the last of which was delivered in 1790. Reynolds was the intimate friend of Dr. Johnson, Goldsmith, Garrick, Burke and other literary celebrities, with whom he was associated in founding the "Literary Club" in 1764. His portraits are distinguished by dignity and grace, and above all by a harmony of color which he had learned in Italy from the great Venetian masters. Apart from portraiture, his other pictures include *Death of Cardinal Beaufort, Macbeth, Puck* and several of the *Holy Family* and *The Nativity.* He died unmarried and was interred in Saint Paul's Cathedral.

Rhadamanthus, *rad a man'thus,* in Greek mythology, a son of Jupiter and Europa, and brother of Minos, king of Crete, whom he assisted in ruling his kingdom. He aroused the jealousy of Minos by his inflexible integrity, which earned for him the admiration of the Cretans, and was forced to flee from the country. After his death he became, on account of his supreme justice, one of the three judges of the lower world.

Rhe'a, in Greek mythology, the daughter of Uranus and Ge (Heaven and Earth), sister and wife of Saturn and mother of Jupiter, Neptune, Pluto, Vesta, Ceres and Juno. She was the symbol of the reproductive power of nature and was often given the name, "Mother of the Gods," or "Great Mother."

Rhea or **Nandu,** the South American ostrich, a close relative to the true ostrich, from which it differs chiefly in having three-toed feet, each toe armed with a claw. The rhea is considerably smaller than the ostrich, and its feathers are not nearly so fine. Rheas have very peculiar nesting habits. Several females lay their eggs in the same nest, or scattered about over the sand. These the male patiently gathers together and sits upon till they are hatched, after which he feeds and cares for the young till they are able to shift for themselves.

Rheims or **Reims,** *reemz,* a town of France, in the Department of Marne, in an extensive basin surrounded by vine-clad hills, 100 miles e. n. e. of Paris. The principal edifices are the thirteenth century cathedral, one of the most beautiful specimens of Gothic architecture extant; the archiepiscopal palace; the Church of Saint Remy; the Porte de Mars; the townhouse, and the Hôtel de Ville. The staple industries are the manufacture of the wine known as champagne, and of woolen fabrics, such as flannels, merinos and blankets. Rheims was an important place in the time of Caesar, being the capital of the Remi and subsequently of Belgic Gaul. Here Saint Remy converted and baptized Clovis and almost all the Frankish chiefs in 496. It was made the seat of an archbishop in the eighth century, and from the time of Philip Augustus (1179) to that of Charles X, the kings of France were crowned here. It has suffered much from war and was at one time in possession of the English, who were expelled by the Maid of Orleans in 1429. It was held by the Germans in 1870–1871. Population in 1901, 108,385.

RHEA

Rhenish Prussia, *ren'ish prush'ah.* See Rhine Province.

Rhenish Wines, the general designation for the wines produced in the region watered by the Rhine and particularly for those of the Rheingau, the white wines of which are the finest in the world. The red wines are not so much esteemed, being considered inferior to those of Bordeaux. Good wines are also produced in the valleys of the Neckar, the Moselle and other tributaries of the Rhine. The vineyards are mainly between Mannheim and Bonn, and the most valuable brands of wines are those of Johannesberg, Steinberg, Hochheim, Rüdesheim, Rauenthal, Markobrunn and Assmannshausen, the last being a red wine. See WINE.

Rhet′oric, in its widest sense, the theory of verbal communication, whether spoken or written. It treats of the general rules of prose style, in view of the end to be served by the composition. In a narrower sense, rhetoric is the art of persuasive speaking, or the art of the orator, and treats of the composition and delivery of discourses intended to move the feelings or sway the will of others. In its wider sense, rhetoric treats of prose composition in general, purity of style, structure of sentences, figures of speech—in short, of whatever relates to clearness, precision, elegance and strength of expression.

Rhine, *rine,* (German, *Rhein*), the largest river of Germany, and one of the most important rivers of Europe. It is formed in the Swiss canton of Grisons by two main streams, called the Vorderrhein and the Hinterrhein. The Vorderrhein rises on the slope of the Saint Gotthard Mountain, at a height of 7690 feet above the sea, near the source of the Rhone, and at Reichenau it unites with the Hinterrhein, which issues from the Rheinwald glacier. Beyond Reichenau the united streams take the common name of Rhine. The Rhine flows northward through Lake Constance to the town of that name, between which and Basel it flows west, forming the boundary between Switzerland and Austria. At Basel it turns once more to the north and enters Germany; and, generally speaking, it pursues a northerly course until it enters Holland, below Emmerich, when it divides into a number of separate branches, forming a great delta and falling into the sea by many mouths.

In the German part of its course the chief tributaries it receives on the west are the Ill, the Moselle, the Aar and the Erft; and on the east, the Neckar, the Main, the Ruhr and the Lippe. In Switzerland its tributaries are short and unimportant, and this part of its course is marked by the falls of the Rhine at Schaffhausen. The chief towns on its banks are Constance and Basel in Switzerland; Speyer, Mannheim, Mainz, Coblenz, Bonn, Cologne and Düsseldorf, with Worms and Strassburg not far distant, in Germany; Arnheim, Utrecht and Leyden, in Holland. It abounds with fish, especially pike, carp, and other white fish, but the produce of its salmon fisheries has been seriously interfered with by the introduction of steam vessels. The total length of the river is about 700 miles, and it is navigable without interruption to Basel, a distance of 550 miles. Much timber, coal, iron and agricultural produce are conveyed by it. Large sums are spent every year in keeping the channel in order and in the erection or repair of river harbors, both in Germany and in Holland.

The Rhine is distinguished for the beauty of its scenery, which attracts many tourists. For a large part of its course it has hills on both sides, at greater or less distances. Pleasant towns and villages lie at the foot; above them rise rocky steeps and slopes clothed with vines or with forests; and the castles and fastnesses of feudal times are seen frowning from precipices apparently inaccessible. The finest part of the Rhine, from the scenic standpoint, is between Bingen and Bonn; after the Rhine enters Holland, the scenery is generally uninteresting.

Rhine′lander, WIS., a city and the county-seat of Oneida co., on the Chicago & Northwestern and the Minneapolis, Saint Paul & Sault Sainte Marie railroads, 65 mi. n. n. e. of Wausau. Among the industries of the city are manufactures of paper, beer and refrigerators. Population in 1905, 5435.

Rhine Province or **Rhenish Prussia,** the most westerly province of Prussia, touching Luxemburg, Belgium and Holland. Its area is 10,423 sq. mi. In the south it is hilly; in the north, low and flat. It is watered by the Rhine, the Moselle and some affluents of the Meuse. Besides the usual cereal crops, tobacco, hops, flax, rape, hemp and beet root are raised; fruit culture and vine culture are also carefully attended to, and famous wines are manufactured along the Rhine and the Moselle. Cattle are extensively reared. The Rhine Province is the most important mineral district in Germany, abounding in coal, iron, lead and zinc. It is likewise an active manufacturing district, containing numerous iron works and machine shops, textile factories, breweries and distilleries. The province is divided into the five governments, or districts, of Coblenz, Treves, Cologne, Aix-la-Chapelle and Düsseldorf. The city of Coblenz is the official capital of the province, but Cologne is the town of most importance. Population in 1900, 5,759,798.

Rhinoceros, *ri nos'e ros,* a genus of hoofed mammals, allied to the elephant, the hippopotamus and the tapir. It is a large, ungainly animal, sometimes measuring five or six feet in height, with short legs and a very thick skin. The head is large, and on the top of the snout are one or two large horns, which are a part of the skin. When two horns are present, the shorter one grows behind the other. These animals live in marshy places and subsist chiefly on grasses and foliage. They are exclusively confined to the warmer parts of the Eastern Hemisphere. It is said that the rhinoceros is followed about by a little bird, which lights upon the back of the animal when asleep and watches for enemies. If any approach, the bird utters a shrill cry into the ear of the sleeping animal, to awake him.

The most familiar species is the *one-horned,* or *Indian, rhinoceros,* which, like all the Asiatic species, has the skin arranged in very definite folds, corresponding to the regions of the body. The horn is black and usually very thick. The upper lip is very large, and is employed by the animal in the manner in which the elephant uses his trunk. Though possessed of great strength, the rhinoceros is quiet and inoffensive, unless provoked. The *Javanese rhinoceros* is distinguished from the Indian chiefly by its smaller size. It has been trained to bear a saddle and to be driven. It is found in Java, Sumatra and Borneo. The Sumatran species is found in Sumatra and the Malay Peninsula. It has two horns, the first being the longer and sharper. The typical *African rhinoceros* is found in southern Africa generally. Like other African species, it possesses no skin-folds. The front horn is broad and raised on a base, is sharp pointed and curved slightly backward, but the hinder horn is short and conical. This animal appears to be of ferocious disposition, is quick and active and is greatly feared by the natives. Other allied African species are the *Keitloa,* or *Sloan's rhinoceros,* the common *white rhinoceros* and the *long-horned white rhinoceros.* Fossil species are numerous.

Rhizopoda, *riz op'o da,* a term given to animals of low organization, belonging to any one of several different orders (See FORAMINIFERA; AMOEBA; RADIOLARIA). They resemble one another in their capability of protruding and retracting filaments or processes from any part of the body. All are protozoans.

Rhode Island, LITTLE RHODY, one of the New England states and the smallest in the Union, is bounded on the n. and e. by Massachusetts, on the s. by the Atlantic Ocean and on the w. by Connecticut. Its length from north to south is not quite 50 mi., and its width is about 40 mi.; its land area is 1085 sq. mi. Population in 1904, 480,082.

SURFACE AND DRAINAGE. There are no mountains in the state, but the surface is considerably diversified. The northern and eastern sections are hilly, and the land slopes toward a level region in the south. The coast along the Atlantic Ocean measures about 45 miles, but Narragansett Bay, which penetrates inland about 30 miles, affords, with its various inlets, about 350 miles of shore washed by tidewater. The southern coast west of Point Judith is low and sandy. To the east the shores are formed by high rocky cliffs, interspersed with beaches of sand. Rhode Island is drained chiefly by the Pawtucket, the Pawtuxet and the Pawcatuck rivers, all navigable for short distances and affording excellent water power.

RHODE ISLAND

1, Providence; 2, Pawtucket; 3, Woonsocket. Dotted lines indicate chief railroads.

CLIMATE. The climate is nearly like that of adjoining states, though somewhat moderated by Narragansett Bay, and the summer season is delightful, particularly in Newport, where the mean temperature is 46°. The average rainfall is 40 inches in the east and 44 inches in the west.

MINERAL RESOURCES. The geological formation of the western portion of the state is chiefly that of the gneiss, which characterizes a great part of southern New England, but under the bay and to the east of it is an extensive coal-bearing formation. Other economic properties are iron ore, limestone, sandstone, serpentine, marble, granite and brick clay.

AGRICULTURE. No portion of the state can be described as exceptionally fertile, and only a very small percentage of the population is engaged in agriculture. Market gardening, however, is an important occupation in certain localities. Corn, rye, oats, barley, potatoes and hay are produced to some extent.

MANUFACTURES. There has been a steady growth in manufacturing interests in Rhode Island since 1850. The textile industries are the most important in the state, with an annual product of over $78,000,000. In the manufacture of cotton goods, Rhode Island is surpassed only by Massachusetts. It ranks third among the woolen goods manufacturing states, and the making of worsted goods is increasing very rapidly, though in other lines of woolens the output is slowly decreasing. In dyeing and finishing textiles, Rhode Island is third in the Union. In the manufacture of jewelry, the city of Providence ranks first in the United States. Other industries include the manufacture of files, rubber and elastic goods, malt liquors and electrical apparatus and supplies. Bristol is famous for its yacht-building. Fishing is an important industry along the coast.

TRANSPORTATION. The state has ample railroad facilities. The principal road is the New York, New Haven & Hartford, which has in the state a mileage of about 200. There are also numerous electric lines, many of which are interurban, connecting the cities of Rhode Island and running into Massachusetts and Connecticut. Various steamship lines connect Providence with the other towns upon the bay and with New York, Philadelphia, Norfolk, Boston and Baltimore.

GOVERNMENT. The legislature consists of a senate and a house of representatives. The senate contains one senator from each town or city, and the house of representatives contains one or more members from each town or city, according to population, except that no town can have more than one-sixth of the 72 members, to which number the house is restricted. The legislature meets annually, and the session is limited to sixty days. The executive department consists of a governor, a lieutenant governor, a secretary, an attorney-general and a treasurer, each elected annually. The courts consist of a supreme court, the judges of which are elected by the general assembly, and such inferior courts as the legislature may establish.

EDUCATION. Rhode Island has a good system of public schools, with excellent high schools in Providence, Pawtucket and Bristol. The principal institutions for higher education are Brown University, the Rhode Island School of Design and the state normal school, at Providence, and the Rhode Island College of Agriculture and Mechanic Arts, at Kingston, with an agricultural experiment farm. The state also has important historical libraries and societies.

CITIES. The principal cities are Providence, the capital; Pawtucket, Woonsocket, Newport and Warwick, each of which is described undei its title.

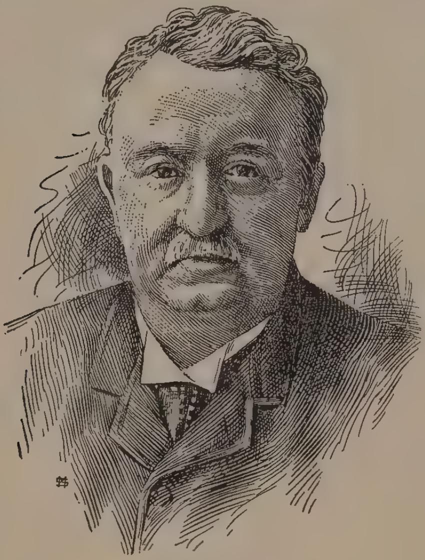
HISTORY. Rhode Island was founded by two exiles from Massachusetts Bay, Roger Williams and Anne Hutchinson, the former founding Providence, the latter, Portsmouth. Newport and Warwick were settled soon after, and in 1644 all the settlements were united under an extremely liberal charter. A new charter, even more liberal in its provisions, was granted in 1663, and under it Rhode Island was governed for nearly 172 years. The colony was from the beginning the seat of all sorts of religious and political controversies and took advanced ground in favor of the Revolution, but was the last state to ratify the Federal Constitution (May 29, 1790). Rhode Island has taken an especially important part in the naval history of the United States, her privateers being prominent factors in all the wars. During the nineteenth century the state enjoyed continuous prosperity and became an important manufacturing center. Its progress was disturbed for a short time in 1841 by Dorr's Rebellion (See DORR, THOMAS). Rhode Island was a Union state during the Civil War and furnished more than her quota of troops to the Federal army. Since that time she has been generally Republican in politics.

Rhodes, *rohdz*, an island in the Mediterranean Sea, belonging to Turkey, off the southwest coast of Asia Minor, from which it is separated by a channel about 12 miles broad. Its area is about 550 sq. mi. It is famous for its prolonged defense by the Knights of Saint John, from 1309 till 1522, when they were forced to abandon the island to the Turks, with whom it has remained ever since

Rhodes, CECIL JOHN (1853–1902), a South African statesman, known as the *Empire Builder*. After attending grammar school, he was sent for his health to Natal, where his brother was a planter. Later he went to the Kimberley diamond diggings, where he soon became conspicuous and amassed a large fortune. In 1876 he went back to England and entered Oriel College, Oxford, and though his residence was cut short by ill health, he ultimately took his degree. He entered the Cape Parliament in 1880 and began at once to develop his idea for the establishment of a British empire in South Africa. By annexing Bechuanaland in 1884, he entered on a struggle with the Boers, with whom nevertheless he had always desired to remain on friendly terms.

The British South African Company, of which

Rhodes was chief, was given control of the territory known as Rhodesia, which Rhodes had induced the king of the Matabele to cede to the English, and Rhodes spent vast sums from his own fortune in developing the country. In 1890 he became premier of Cape Colony, and his policy was always one of propitiation toward the Dutch. The Jameson Raid deprived him of much influence, and he was obliged to resign the office of premier. He was a member of the Cape Parliament at the outbreak of the South African War, was at Kimberley during the time of the siege and took part in the defense of the city. The greater part of Rhodes's fortune was left for the establishment of scholarships at Oxford University for South African, Australian, Canadian, German and American students. See Rhodes Scholarships.


CECIL RHODES

Rhodesia, *road'ze a* or *ro de'she a,* a British possession in South Africa, lying between about 8° 30′ and 22° south latitude, and bounded by Kongo Free State and German East Africa on the n.; by British Central Africa and Portuguese East Africa on the e.; by Transvaal Colony on the s., and by Bechuanaland, German Southwest Africa and Portuguese Southwest Africa on the w. It is divided into two great divisions, Southern Rhodesia and Northern Rhodesia, separated by the Zambezi River.

Southern Rhodesia, also known as British South Africa, consists of two provinces, Matabeleland and Mashonaland, and has an area of about 144,000 square miles. Its population is about 600,000, of which about 13,000 are Europeans and Asiatics. The country is rich in minerals, especially gold, silver, copper, blend, antimony, arsenic, lead and coal. The principal towns are Salisbury, the capital; Victoria, Umtali and Bulawayo. The first and last named have newspapers, banks, churches, hotels, schools, libraries and all modern conveniences. There are about 3000 miles of roads and post routes in the district. The Cape-to-Cairo railroad also crosses the region, and there are other short connecting roads. The telegraph lines in Rhodesia are about 4000 miles in extent.

Northern Rhodesia is divided into two provinces, Northeastern and Northwestern Rhodesia. The former has an area of about 600,000 square miles, and a population of about 346,000, of which not more than 300 are of foreign birth. The principal towns are Fife and Abercorn. Northwestern Rhodesia has an area of about 182,000 square miles and a population of 400,000. It is practically undeveloped. Northern Rhodesia contains valuable deposits of several minerals, and much of the territory is suitable for cultivation.

Rhodesia is now administered by the British South Africa Company, under a special order of the British government, in accordance with which three administrators were appointed, one each for Southern Rhodesia, Northeastern Rhodesia and Northwestern Rhodesia, all subject to a resident commissioner and commandant-general, whose seat is at Salisbury. Each administrator is assisted in the government of his province by an executive council, consisting of at least four members, and by a legislative council consisting of the administrator, who presides, seven members nominated by the company and approved by the secretary of state, and seven members elected by the voters of the colony.

Rhodes Scholarships, a number of scholarships established by the will of Cecil Rhodes, for the purpose of maintaining a certain number of British, American and German students at Oxford University, in the belief that "a good understanding between England, Germany and the United States will secure the peace of the world and that educational relations form the strongest tie." The scholarships are apportioned as follows: Australia, eighteen; New Zealand, three; Canada, six; Newfoundland, three; Rhodesia, nine; Cape Colony, twelve;

Natal, three; Bermuda, three; Jamaica, three; Germany, fifteen; each state and territory of the United States, two. The beneficiaries from Germany are appointed by the emperor. Those from the United States are selected by committees chosen in each state and territory. The chairmen of these committees are usually the presidents of the state universities, and in some of the eastern states, of the leading universities of the state. Each committee makes recommendations from those passing the required examination, which includes Latin, Greek and elementary mathematics. Candidates must be between nineteen and twenty-five years of age, unmarried and citizens of the states from which they are appointed. The scholarships are awarded on the following plan: Proficiency in literary and scholastic attainments count three-tenths; success in outdoor sports, two-tenths; qualities of manhood, three-tenths; qualities of leadership, two-tenths. The second and third qualifications are determined by vote of the fellow students, and the first and fourth by the faculty of the respective schools in which candidates prepare. The value of the American scholarships is $1500 a year and is tenable for three years. Only one-half of these appointments can be filled each year. See RHODES, CECIL JOHN.

Rho'doden'dron, a genus of trees and shrubs, containing about one hundred seventy species, native of the mountains of North America, Europe and Asia. The ordinary American species is the *California*, or *catawba, rhododendron,* found wild in the Alleghanies from Virginia southward. The flowers are bell-shaped and lilac, but the cultivated varieties are of different colors. The *American laurel,* also found in the Alleghanies and farther north, is taller and has pink waxy flowers and narrow leaves. One well-known European species grows wild along the Black Sea. It has yellow fragrant flowers and is very poisonous. The tree rhododendron of the Himalayas grows twenty-five feet high and has silvery leaves and scarlet flowers. Most of the rhododendrons are cultivated in gardens and hothouses and are favorites because of their beautiful flowers and leaves. See AZALEA.

Rhone, a river of Europe, which rises in Switzerland, near the east frontiers of the Canton of Valais. Its precise origin is the Rhone Glacier, 7550 feet above the level of the sea. It passes through the Lake of Geneva, and enters France, flowing first southward and then westward to the city of Lyons, where it turns almost due south. It so continues till it falls into the Gulf of Lyons by a greater and a smaller mouth, forming here an extensive delta. Its principal affluent is the Saône, which enters it at the city of Lyons; other large tributaries are the Isère and the Durance. Its whole course is about 500 miles, and it is navigable for about 320 miles. By means of a series of magnificent canals, the navigation of the Rhone has been continued without interruption to the Rhine, the Seine, the Loire, the Meuse and the Belgian system of canals.

Rhubarb, *ru'bahrb,* a genus of garden plants, natives of Central Asia, though introduced widely into other countries. The plants have strong, branching, almost fleshy roots, and erect, branching stems, six to eight feet high. At present most of the Asiatic rhubarb comes from China. The leafstalks are now largely used in cooking, being boiled as sauce, and the juice is made into a kind of wine.

Rhyme, in poetry, a correspondence in sound of the terminating word or syllable of one line of poetry with the terminating word or syllable of another. To constitute this correspondence in single words or in syllables it is necessary that the vowel and the *final* consonantal sound (if any) should be the same, or have nearly the same sound, the initial consonants being different. English writers have allowed themselves certain license, and we find in the best English poets rhymes which strike an accurate ear as incorrect, such as *sky* and *liberty, gone* and *alone.* Such rhymes may be tolerated if they only occur at rare intervals, but they must certainly be regarded as blemishes. If the rhyme is only in the last syllables, as in *forgave* and *behave,* it is called a *single* rhyme; if in the last two syllables, as *bitter* and *glitter,* it is called a *double* rhyme; if in the last three syllables, as *callosity* and *reciprocity,* it is called a *triple* rhyme. This last sort of rhymes is principally used in pieces of a comic or conversational character. Rhymes which extend to more than three syllables are almost confined to the Arabians and Persians in their short odes, in which the same rhyme, carried through the whole poem, extends sometimes to four and more syllables. The modern use of rhyme was not known to the Greeks and Romans, though some rhymed verses occur in *Ovid.* It has been used, on the other hand, from time immemorial among Chinese, Hindus, Arabs and other Oriental nations. Rhyme began to be developed among Western nations in the Latin poetry of the Christian Church as early as the fourth century. The early English, German and Scandinavian poems are distinguished by alliteration, instead of rhyme. The term *rhyme* is also used to designate verses or stanzas which end in rhymes, or in a wider sense, poetry in general.

Rhythm, *rith'm,* in general, a measured succession of divisions or intervals, in written composition, music or dancing. The rhythm of poetry is the regular succession of accent, emphasis or voice stress; that is, a certain succession of long and short syllables in a verse. In music, rhythm is the disposition of the notes of a composition in respect to time and measure; the measured beat which marks the character and expression of the music.

Rib, in architecture, a molding on a vaulted roof or flat ceiling. Ribs were first used in the Romanesque style of architecture during the eleventh century and became a very important feature in Gothic architecture. At first they were heavy and plain, but gradually they became slender and elaborately decorated with carving, cusp and tracery being used in the late Gothic ribbing.

Ribbon Fish, the name of certain deep-sea fishes, met with in all parts of the ocean, generally found floating dead on the surface or thrown ashore by the waves. The body is like a band, from fifteen to twenty feet long, about one foot broad and an inch or two thick. These fishes are generally silvery in color. They live at such a depth that when they reach the surface the expansion of gases in the body so loosens all parts of the muscular and bony system that some portions are nearly always broken on lifting them out of the water. The fin rays in younger ribbon fishes are extraordinarily developed, some of them being several times longer than the body. The name is also applied to a fish found around the Gulf of Mexico and the West Indies. It has blackish-brown ribbon bands on a grayish body.

Ribbon Worm, an animal found on the seacoast of various countries. It has a long, flat, ribbon-like body, which sometimes attains a length of from thirty to forty feet. The worm can suddenly contract its body to three or four feet.

Ribot, *re bo',* ALEXANDRE FELIX JOSEPH (1842–), a French statesman. He received a law education in Paris and in 1875 was appointed director of criminal affairs and pardons. Three years later he became a member of the Chamber of Deputies, and he was reëlected in 1881 and again in 1887. He held the portfolio of foreign affairs in 1890 and became president of the cabinet in 1892. In 1895 President Faure appointed him premier, but he held the office only a short time.

Ricardo, *re kahr'do,* DAVID (1772–1823), a celebrated writer on finance and political economy. He was the son of a Jewish stockbroker and was born in London. In 1793 he embraced Christianity and married a Christian wife. After the break with his father which this occasioned, he began business as a stockbroker on his own account, and in a short time he realized an immense fortune. His first publication was on the subject of the depreciation of the national currency. Several other pamphlets and essays followed this, but his most important work is *The Principles of Political Economy and Taxation,* which appeared in 1817. In 1819 he entered Parliament as a member for Portarlington. Though Ricardo's mode of treatment is totally different, he belongs essentially to the school of Adam Smith.

Rice, an important grain and food plant. Rice was known in the East long before it was introduced into Egypt and Greece. It is now cultivated extensively in the low grounds of the tropical and sub-tropical parts of southeastern Asia, Egypt, Japan, part of the United States and several districts of southern Europe. The stem is from one to six feet high, erect, simple, round and jointed; the leaves are large, firm and pointed, arising from very long, cylindrical and finely striped sheaths; the flowers are disposed in a panicle, somewhat resembling that of the oat; the seeds are white and oblong, but vary in size and form in the numerous varieties. In the cultivation of this plant a high summer temperature is required, combined with abundance of water. Thus, the seaboard areas and river deltas, which are subject to inundation, give the best conditions; otherwise, irrigation is necessary. The amount of water required by the plant depends upon its strength and stage of growth. In the United States it is grown chiefly in the swampy districts of South Carolina, Georgia and Louisiana. The seed is planted and wet thoroughly, so it will sprout. When the plants appear above ground the land is flooded to the depth of four or five inches, and the water is allowed to remain until the leaves float on the surface. The water is then drawn off, the land is cultivated and the plant is allowed to grow and root firmly. When this is accomplished the land is again flooded, and the water remains until the grain is ripe.

In the husk, rice is known by the name of *paddy*. Rice is more largely consumed by the inhabitants of the world than any other grain. See GRAINS, *color plate*, Fig. 1.

Rice, ALICE HEGAN (1870–), an American author, born in Shelbyville, Ky. She achieved fame as the author of *Mrs. Wiggs of the Cabbage Patch*, its sequel, *Lovey Mary*, and *Sandy*, which first appeared in the *Century Magazine*. These stories are light, but the characters are genuine and have real and original humor.

Rice Bunting. See BOBOLINK.

Rice Paper, a substance prepared from thin, uniform slices of the snow-white pith of a plant which grows in Formosa. Rice paper is prepared in China and is used in the manufacture of artificial flowers and by native artists for water color drawings.

Rich'ard I, surnamed Coeur de Lion (the Lion-hearted) (1157–1199), king of England, second son of Henry II. He several times rebelled against his father, and in 1189, supported by the king of France, he defeated the forces of Henry, who was compelled to acknowledge Richard as his heir. On Henry's death, Richard was crowned at Westminster. The principal events of his reign are connected with the Third Crusade, in which he took part, uniting his forces with those of Philip of France. He won some slight victories, but gained nothing permanent, and after making a truce with the sultan he set out for England. While making his way through Austria he was taken captive and kept in prison for some time, until the payment of a large ransom.

Richard II (1367–1400), king of England, son of Edward the Black Prince, and grandson of Edward III, whom he succeeded in 1377. In 1381 the insurrection headed by Wat Tyler took place, in the suppression of which the boy king showed considerable capacity and boldness, but his after life did not correspond with this early promise (See TYLER, WAT). Wars with France and Scotland, and the ambitious intrigues of the duke of Lancaster, one of his uncles, disquieted the country for some years. A quarrel having broken out between Richard's cousin, the duke of Hereford, son of John of Gaunt, and the duke of Norfolk, Richard banished them both, expressly providing, however, that Hereford should have the right to inherit any property which might fall to him. The next year, 1399, John of Gaunt, Hereford's father, died, and Richard confiscated his estates. This unjust act was the immediate cause of the king's fall. During his absence in Ireland, Bolingbroke, as the duke of Hereford was called, landed in Yorkshire with a small force, and the king on his return to England was solemnly deposed by Parliament, the crown being awarded to Henry. Richard was imprisoned in the castle of Pomfret, where he is supposed to have been murdered.

Richard III (1452–1485), king of England, the youngest son of Richard, duke of York, who was killed at Wakefield. On the accession of his brother, Edward IV, he was created duke of Gloucester, and during the early part of Edward's reign he served him with great courage and fidelity. He married in 1473 Anne of Neville, joint heiress of the earl of Warwick, whose other daughter was married to the duke of Clarence, and quarrels arose between the two brothers over their wives' inheritance. On the death of Edward, in 1483, the duke of Gloucester was appointed protector of the kingdom; and he immediately caused his nephew, the young Edward V, to be declared king and took an oath of fealty to him. But Richard soon began to pursue his own ambitious schemes. The most influential relatives of the queen mother were arrested and beheaded, and Edward was imprisoned in the Tower. It was now asserted that the young king and his brother were illegitimate, and that Richard had a legal title to the crown. A subservient Parliament crowned him, and it is believed that shortly afterward he had his nephews put to death. When the earl of Richmond, the head of the house of Lancaster, landed in England with an army, in 1485, Richard met him at Bosworth, but was defeated and killed.

Rich'ardson, HENRY HOBSON (1838–1886), an American architect, born in Louisiana. He graduated from Harvard and afterward went to Paris, where he remained until 1865, studying architecture. He became prominent as an architect of Brattle Street Church, Boston, and he spent about six years on Trinity Church in the same city. He was employed on the New York state capitol for several years and designed numerous public library buildings and railway stations. His work has much individuality and exerted a marked influence on his profession in the United States.

Richardson, SAMUEL (1689–1761), an English novelist, born in Derbyshire. He received only an elementary education, and the greater part of his life was spent in the printing business, at first as an apprentice and later on his own account. When he was past fifty, he was asked by two booksellers to compose a "familiar letter writer," and he conceived the plan of having the letters tell a complete story. This story, told in letters, published under the title of *Pamela, or Virtue Rewarded,* was immensely popular. In 1749 *Clarissa Harlowe* appeared, and was followed in 1753 by *The History of Sir Charles Grandison. Clarissa Harlowe* is regarded as his masterpiece, while *Sir Charles Grandison,* in which he deals with unfamiliar characters of high life, falls somewhat below its predecessors. Richardson's novels, though wearisome through their excess of detail, give deeply sympathetic character pictures and had much to do with the development of the novel, especially in its dramatic aspects

Richelieu, *reesh lyö',* ARMAND JEAN DUPLESSIS, Duke de, Cardinal (1585–1642), a French statesman, born in Paris. He was originally destined for the army; but when his brother Alphonse resigned the bishopric of Luçon, this was bestowed on him by Henry IV. He obtained from the pope a dispensation allowing him to accept the office, though under age, and in 1607 he was consecrated bishop. He went to Paris in 1614 as deputy of the clergy of Poitou to the States-General and insinuated himself into the favor of the queen mother, Marie de Medici, who obtained for him the post of grand almoner, and in 1616 he was made secretary of state for war and foreign affairs. When Louis XIII quarreled with his mother in 1617, Richelieu was banished, first to Blois and then to Avignon. In 1620, however, he managed to effect a reconciliation between the queen mother and her son. He now obtained the cardinal's hat, and in 1624 he was again admitted to the Council of State.

From this date he was at the head of affairs, and he at once began systematically to extend the power of the Crown, by crushing the Huguenots and by overthrowing the privileges of the great vassals, and to increase the influence of the French monarchy, by undermining that of the Hapsburgs, both beyond the Pyrenees and in Germany. After the suppression of the Huguenots his next step was the removal of the queen mother from court, she having endeavored to effect his fall. In 1631 Richelieu was raised to the rank of duke. The whole period of his government was marked by a series of conspiracies of the feudal nobility, the queen mother, the queen herself and even Louis, against the royal power exercised by Richelieu. Richelieu was a great statesman, but he was proud, arrogant and vindictive. He was a patron of letters and art and was the founder of the French Academy.

Rich'mond, IND., the county-seat of Wayne co., 68 mi. e. of Indianapolis, on the Whitewater River and on the Pittsburg, Cincinnati, Chicago & Saint Louis, the Chicago, Cincinnati & Louisville, the Grand Rapids & Indiana and several electric railroads. Earlham College is located here, and the city also has the Saint Mary's Academy, a business college, the Morrison-Reeves Public Library, a law library, Eastern Indiana Hospital for the Insane and other charitable institutions. Glen Miller Park, near the city, covers an area of 135 acres. There are about 300 manufacturing establishments, producing threshers, engines, agricultural implements, boilers, carriages, milling machinery, flour, dairy products and other articles. Richmond was settled by Friends from North Carolina in 1816 and was chartered as a city in 1840. Population in 1900, 18,226.

Richmond, VA., the capital and largest city of the state, situated on the north bank of the James River, about 125 mi. from its mouth and 115 mi. s. by w. from Washington, and on the Atlantic Coast Line, the Chesapeake & Ohio, the Richmond-Washington, the Seaboard Air Line and the Southern railroads. The city has an area of about 5 sq. mi., but including suburbs it covers about 16 sq. mi. It is built on a series of hills that rise in terraces from the river until they reach altitudes varying from 170 to 250 feet above the sea. The summits of these hills are plateaus, upon which the chief residential sections of the city are located. A number of bridges connect the city with Manchester, Bon Air, Granite, Forest Hill, Spring Hill and other places on the opposite side of the river. The city is well laid out, and about one-third of the streets are paved. In the residential sections the streets are broad and well shaded, and most of the homes have beautiful lawns decorated with flowers and shrubbery.

The chief point of interest is Capitol Square, with an area of 12 acres, occupying the central part of Shockoe Hill. Here is located the state capitol, completed in 1789 and constructed from a model of an old Roman temple at Nimes, France, and there known as Maison Carrée. This model was sent to Virginia by Thomas Jefferson and is still preserved in the Virginia State Library. Beneath the dome is a life-size statue of Washington, by Houdon. Within this square are also located the state library and the governor's mansion, while Saint Paul's Church and the city hall, which is one of the finest public buildings of the city, overlook the square. Near the west gate of Capitol Square is an equestrian statue of Washington, by Crawford. This is of bronze and is considered one of the finest works of its kind in America. The base is surrounded by bronze figures of Thomas Jefferson, Patrick Henry, John Marshall, George Mason, Thomas Nelson and Andrew Lewis. Near by is a life-size marble statue of Henry Clay, and on the north of the capitol are the bronze statues of Stonewall Jackson, Governor Smith and Dr. Hunter McGuire.

Other buildings of historic interest are the house occupied by Jefferson Davis while president of the Confederacy and now used as a museum of Confederate relics, the home of Chief Justice Marshall, the home of General Lee and the Virginia State Library. The Masonic Temple, exposition buildings, soldiers' home and Valentine Museum are also worthy of mention as important structures in the city. In addition to Capitol Square there are a number of other parks which are of interest. Monroe Park contains a statue of General Wickham. Libby Hill, or Marshall Park, has the monument to the Confederate Soldiers and sailors and commands an excellent view of the river and the opposite shore.

In Lee Circle is an equestrian statue of General Robert E. Lee, one of the finest pieces of art work in the city. Near here are the monuments to Jefferson Davis and General J. E. B. Stuart. In Chimberazo Park is the Confederate hospital A number of cemeteries, noted for their beauty, contain graves of thousands of Union and Confederate soldiers. Of these, perhaps the most interesting is Hollywood Cemetery, because it is the burial place of many noted men. It contains the graves of Presidents Monroe and Tyler, also of Jefferson Davis and of a number of noted Confederate generals.

The chief industries are connected with the preparation of tobacco. These employ about 6000 people. Other industries of importance include foundries, machine shops, fertilizer works, wagon and carriage factories, lumber mills, locomotive shops and baking powder works. Richmond is an important distributing center for a large area, including southeastern Virginia and portions of North Carolina and South Carolina, so that it has a large trade. It is also connected by regular lines of steamers with the leading ports on Chesapeake Bay and the Atlantic, and in addition to this it has some trade with foreign ports.

The educational institutions include the University College of Medicine, the Medical College of Virginia, Richmond College, Richmond Theological Seminary (a Baptist institution), the Richmond Female Institute and the Richmond Female Seminary, Hartshorn Memorial College for Girls, Visitation Academy and a number of other Roman Catholic schools, a training school for kindergartners, an art school, Hartshorn Memorial College for Colored Girls, the Virginia Mechanics' Institute and normal schools for both white and colored students. The libraries include the state library of 100,000 volumes, the state law library, the Rosemary Public Library and the library of the Virginia Historical Society. The charitable institutions include a number of hospitals, the city almshouses, the retreat for the sick, the city orphan asylum, Lee Camp Soldiers' Home, Saint Joseph's Orphan Asylum and many others of equal prominence.

The churches are noted for their historic association more than for their architecture. Chief among these is the Saint John's Episcopal Church, built in 1740 and still in an excellent state of preservation and used for religious services. It was in this church that the convention met in 1775 to hear the report of the First Continental Congress, when Patrick Henry made his celebrated speech ending with the words, "But as for me, give me liberty or give me death!" Monumental Church is also of historical importance, because it stands upon the site of a building in which, in 1788, the convention met that adopted the Constitution of the United States. On this site was also located a theater which burned in 1811. Over sixty people were killed in this fire, including William Smith, then governor of Virginia.

Richmond was settled in 1737 and was incorporated in 1742. It became the capital of Virginia in 1779, at which time it was only a small village. It has been the scene of many events of historical importance. In its statehouse were passed the celebrated Virginia Resolutions (See Kentucky and Virginia Resolutions), and the ordinance of secession for the State of Virginia, and here also occurred the famous trial of Aaron Burr. From 1861 to 1865 the city was the capital of the Confederate states. Because of this, during the Civil War it was the main point of attack by the Federal armies in the East, and no less than fifteen battles and twenty-five skirmishes occurred during the attempt of the Federal troops to capture the city. It was evacuated by the Confederate forces on April 2, 1865, at which time a fire set to the public buildings destroyed a large portion of the city. After the close of the war the city was rebuilt and has continued to prosper. Population in 1906, 115,000. Consult Powell's *Historic Towns in the Southern States.*

Richter, *riK'tur,* EUGEN (1838–), a German politician. He entered the Prussian Diet in 1869, was chosen to the Imperial Diet two years later, and became the able and acknowledged leader of the Progressists. He is the author of several economic publications and is an eminent authority on financial questions.

Richter, JOHANN PAUL FRIEDRICH, commonly called JEAN PAUL (1763–1825), a German author. In 1781 he entered the University of Leipzig to study theology, but soon changed his plan and devoted himself to literature. In 1784 he was forced to leave Leipzig, to avoid imprisonment for debt. From 1787 to 1794 he taught school; but during these years he also wrote and published his *Greenland Lawsuits, Selection from the Devil's Papers* and the romance, *The Invisible Lodge.* The last-named work brought him fame. Then followed in rapid succession, and with decided success, *Hesperus, Life of Quintus Fixlein* and *Flower, Fruit and Thorn Pieces.* But his best works are the romances *Titan* and *Wild Oats* and his philosophical treatise *Introduction to Aesthetics.* Richter is the greatest humorist of modern German literature. His works are, moreover, full of sound philosophy and real poetry, but they lack artistic literary form.

Rick'etts, JAMES BREWERTON (1817–1887), an American soldier, born in New York City. He graduated at West Point and entered the Revolutionary service in the Mexican War. He was captured at Bull Run soon after the outbreak of the Civil War, but was released some months later and took part in the second Battle of Bull Run. At Antietam he commanded a division which bore the hardest part of the fighting, and in 1864 he was with Sheridan in his Shenandoah Valley campaign. He was brevetted major general in the regular army in March, 1865. Two years later he retired from the service with the full rank of major general.

Rideau, *re do',* **Canal,** a Canadian canal, constructed between Kingston, on Lake Ontario, and Ottawa, as a through waterway, by means of the River Ottawa, to Montreal, the Saint Lawrence route being interrupted by rapids. Canals have since been built along the Saint Lawrence to avoid these, and the Rideau is now little used.

Ridgway, *rij'way,* ROBERT (1850–), an American ornithologist, born at Mount Carmel, Ill. He early devoted himself to natural history and was appointed in 1869 zoölogist to the United States geological exploration of the fortieth parallel. During his work on this expedition he made collections of the birds, nests and eggs of the region through which he passed. In 1880 he was made curator of the division of birds in the United States National Museum. Among his writings are *Manual of North American Birds* and *The Birds of North and Middle America,* in eight volumes. This latter is one of the most important works on ornithology ever published. Ridgway collaborated with Spencer F. Baird and Thomas M. Brewer in a number of other books.

Ri'ding, the art of sitting on horseback with firmness, ease and gracefulness and of guiding the horse and keeping him under perfect command. Walking, trotting and galloping are the three natural paces of the horse, but these may be converted into artificial paces by art and skill, by shortening or quickening the motion of the horse. The position of a rider should be upright in the saddle; the legs and thighs should be turned in easily, so that the fore part of the inside of the knees may press and grasp the saddle, and the legs hang down easily and naturally, the feet parallel to the horse's sides, turned neither in nor out, the toes a little higher than the heels. The hand holding the reins is generally kept clear of the body, and immediately over the pummel of the saddle. A firm and well-balanced position of the body is of the utmost consequence, as it affects the horse in every motion; and the hands and legs ought to act in correspondence with each other in everything, the latter being always subservient to the former. The art of riding is not difficult of attainment, but it is one which can only be mastered by practical instruction and constant practice.

The history of horsemanship goes far back into ancient times. The Greeks, the Egyptians, the Assyrians and the Persians all were skilful horsemen, and horse races were common in their games and festivals. The Romans learned from the Greeks the use of horses, and among the athletic youths no sports were more popular than those on horseback. In medieval times, riding was a universal accomplishment among the wealthy and high born, but in modern times, owing to the introduction of steam and electricity, it has ceased to be of first importance; yet in every locality the sport has its devotees. Many books have been published on the subject, among which might be mentioned, of English books, Anderson's *Modern Horsemanship* and Hayes's *The Horsewoman*; and of American books, Kerr's *Riding for Ladies*, Dodge's *Riders of Many Lands* and Hayes's *Riding and Hunting*. See RACE.

Rid'ley, NICHOLAS (about 1500–1555), a Protestant martyr. He was educated in the grammar school of Newcastle-on-Tyne and in Pembroke Hall, Cambridge. In the college, through the teachings of Tyndale, he began to take much interest in the Reformation. After three years spent in France, Ridley returned to England, and in 1533 he was made proctor to the University of Cambridge, then, successively, chaplain to Cranmer and to the king, canon of Canterbury, canon of Westminster, bishop of Rochester and bishop of London. Ridley helped Cranmer in the *Forty-one Articles*, afterwards reduced to thirty-nine, and persuaded Edward VI to found Christ's, Saint Thomas's and Saint Bartholomew's hospitals. On the death of Edward VI, Ridley supported the cause of Lady Jane Grey, and when Mary came to the throne she refused to make peace with him and sent him to the Tower. He was burned at the stake with Latimer.

Rid'path, JOHN CLARK (1830–1900), an educator and historian, born in Putnam County, Ind., and educated at De Pauw University. He began teaching in Thorntown (Ind.) Academy and occupied, successively, the positions of superintendent of schools at Lawrenceburg, Ind., professor of languages at Baker University, Baldwin, Kan., and professor of English and history in Asbury (now De Pauw) University, of which he became vice-president. Doctor Ridpath devoted the last years of his life to literary pursuits. He was the author of a *Popular History of the United States*, a *Cyclopedia of Universal History, Life of James A. Garfield, Great Races of Mankind, History of the World* and several other historical works.

Rienzi, *re en'ze,* COLA DI (about 1313–1354), a popular Roman leader. Aroused by the oppression of the people by the nobles, he instigated a rising against the nobility. In 1347, during the absence of the governor of Rome, he assembled his friends upon Mount Aventine and induced them all to subscribe to an oath for the establishment of a republican government. The people conferred upon him the title of tribune, with all the attributes of sovereignty. He banished several noble families and compelled those who remained to do him homage. His strict regard for justice and the public good in the first exercise of his power induced even the pope to countenance him. But he subsequently became ambitious and haughty, and, finding he had lost the confidence of the people, he withdrew from Rome late in 1347. He attempted, two years later, to gain the support of Emperor Charles IV in his attempt to reconquer Rome, but the emperor imprisoned him and handed him over to Pope Clement at Avignon. Innocent VI released Rienzi and sent him to Rome to oppose another popular demagogue, and the people received him enthusiastically. After a turbulent administration of a few months, however, he was killed. Bulwer-Lytton made Rienzi the hero of a novel, and Wagner used his life as the basis for an opera.

Riesengebirge, *re'zen ge beer'ge,* a mountain range of Europe, separating Silesia from Bohemia and forming a part of the Sudetic Mountains. It contains the loftiest mountains of the north or central parts of Germany, the Schneekoppe being 5265 feet high.

Rietschel, *reech'el,* ERNST (1804–1861), one of the greatest of German sculptors, born at Pulsnitz, Saxony. His first study was done at the Dresden Academy, where he attracted considerable attention. He studied under Rauch and in 1831 visited Italy. On his return to Berlin he became professor at the Academy in Dresden, which position he held until the time of his death. His works are very numerous, and among the celebrated ones are twelve reliefs, showing the *Main Epochs of Civilization*, the well-known relief, the *Christ Angel*, the *Pieta*, the *Goethe-Schiller Monument*, the *Quadriga* and the *Luther Monument*, the latter of which is perhaps his masterpiece.

Ri'fle, a portable firearm, the interior surface of the barrel of which is grooved, the channels being cut in the form of a screw. The number of these spiral channels or threads, as well as their depth, varies in different rifles, the most approved form having the channels and ridges of equal breadth, the spiral turning more quickly as it nears the muzzle. The bullet fired is now always of an elongated form. The great advantage gained by a weapon of this construction is that the bullet, having a rotary action, is preserved in its direct path, without being subject to the aberrations that injure precision of aim in firing with unrifled arms. As a necessary consequence of the projectile being carried more directly in its line of aim, its length of range, as well as its certainty in hitting the object, is materially increased. Rifles were invented in Germany in 1498 and have been used as military weapons since 1631. In 1851 the first rifle firing an elongated bullet appeared, under the name of the Minié. It was succeeded in 1853 by the Enfield rifle. The chief feature of this rifle was the reduction of the bore to .577 inches in diameter, which made the weapon much lighter. Next came the breech-loading rifle. In this rifle the breech is closed by a block, which contains a piston, or striker, the latter exploding the cartridge by the force of a strong spiral spring passing round it. The German needle rifle and the French Chassepot rifle were the first of the breech-loading rifles to acquire a reputation in actual warfare.

The repeating rifle is a development of a very old type of weapon. In the Spencer, the first used with signal success, the cartridges are in the stock of the arm; in the Winchester, the best known of repeating rifles, they are in a tube underneath the barrel. More modern military magazine rifles draw their supply of cartridges from a reserve, contained in a detachable magazine, the advantage being the greater efficiency of the weapon as a single loader.

Within the last fifty years there have been numerous improvements, all tending to make more serviceable rifles, which could be operated with greater rapidity and could be more accurately fired and at the same time possessed greater carrying power. In all these inventions the United States has kept pace with the rest of the world. In 1905 an army officer, after experimenting with the United States magazine rifle, considered it to be the most powerful military arm in the world. Its wonderful rapidity and great power give it a recoil, however, that makes it a difficult task for the soldier to use it, and it is probable that no advancement can be made in these directions until some method has been found of diminishing the recoil. The 1903 rifle differs little in power and range from the Krag-Jorgensen, formerly used by the United States, and from various guns now in the hands of European armies. It is 43.4 inches long, so that it might replace the carbine, or shortened rifle, which was formerly carried by the cavalry. Its caliber is .30, and its weight, with the bayonet, about $9\frac{1}{2}$ pounds. The ball on leaving the muzzle travels at a rate of 2300 feet per second and will travel over 4700 yards. Accurate shooting may be done at a range of one mile. About 220 grains of smokeless powder are used, and the elongated bullet weighs 44 grains. So powerful is the explosion that the rifling wears down very rapidly, and only about 1000 or 1500 rounds can be fired with perfect accuracy. For fine shooting, a telescopic sight, easily detachable, is supplied. Lead bullets only can be used, because their weight gives them a greater momentum and accuracy, but the lead is steel coated, to prevent filling the rifling in the barrel. The penetrating power of these bullets is astonishing. They will go $3\frac{3}{4}$ feet into the solid earth; will penetrate 5 feet of soft wood or $\frac{5}{16}$ inches of hardened steel. If a half dozen men were standing one behind another, the bullet would pass through all, inflicting a small flesh wound, less dangerous than the old-fashioned lead bullets (See BULLET). When the modern rifle is cocked, the empty cartridge is expelled and a fresh cartridge enters. The magazine lies under the breech and contains five cartridges, which may be inserted in a single package or singly. As the cartridges are fired, a spring pushes them forward, one after another, into the chamber. It is possible to fire 42 shots a minute with this weapon, but so great is the heat from such rapid firing that it has been found necessary to coat the lower side of the rifle barrel through almost its entire length, to protect the hands of the soldiers.

The ordinary sporting rifles have been equipped with the improvements that were used in military arms, but as the purpose of the sporting rifle is different, all improvements have been modified and some new ones made. For instance, the sights have been so arranged as to aid the amateur, the stocks have been omitted and the weight of the rifle has been lessened, until it can be handled with moderate ease.

Riga, *re'ga*, a seaport of Russia, capital of the Government of Livonia, on both sides of the Düna, about 5 mi. above its mouth in the Gulf of Riga. The public buildings are numerous, but few of them are deserving of particular notice, except the cathedral, Saint Peter's church, the castle, or governor's residence, and the town-hall. The manufactures are not of great importance, but the trade is very extensive, the principal exports being flax, hemp, timber, linseed, grain and eggs. Ships can come up to the town, or they may unload and take in cargo at the port at the mouth of the river. A large part of the trade is with Great Britain. Population, 282,943, nearly one-half of whom are Germans.

Riga or **Livo'nia**, Gulf of, a gulf of the Baltic, which washes the coasts of Courland, Livonia and Esthonia and contracts in the west to a comparatively narrow entrance, the Island of Oesel almost closing it on the northwest. The chief river which it receives is the Düna.

Riggs, Kate Douglas Wiggin (1857–), an American author, born in Philadelphia. She was educated in New England, then moved to California. She studied kindergarten methods in Los Angeles and successfully established the first free kindergarten on the Pacific coast. Although she was married to George C. Riggs in 1895, she continues to write under her old name. *The Birds' Christmas Carol* gave her a reputation as a humorist and *The Story of Patsey, The Diary of a Goose Girl* and *Rebecca of Sunnybrook Farm* are well known. She has also written articles on kindergarten work and two volumes of verse for children.

Right of Way, the right of passing over land which is not one's own. Rights of this kind are public, if enjoyed by everybody; private, if enjoyed by a certain person or class of persons. Wherever there is a public right of way, there is a highway. The origin of a highway is generally in a dedication thereof to the public by an owner. Such dedication will be implied from the use of the highway by the public for a reasonable number of years. A highway may also be established by act of legislature.

Riis, *rees,* Jacob Augustus (1849–), an American journalist, author and social reformer, born at Ribe, Denmark. He came to America at the age of twenty, and after working at various trades, he took up newspaper work in New York City. He was police reporter for the *Sun* when Theodore Roosevelt was police commissioner, and he was of great assistance to the commissioner in his investigations of police methods His vivid picture of slum life in *How the Other Half Lives* has become well known. By his writings and lectures, he did much to help on the reforms in the slums and especially in the establishment of small parks in the congested districts. His writings also include *Out of Mulberry Street,* a collection of fiction; *The Battle with the Slums,* and *The Making of an American.* One of his later works, *Theodore Roosevelt, the Citizen,* has been widely read. In this sketch the author appears as a most enthusiastic admirer of Roosevelt.

Ri'ley, James Whitcomb (1853–), an American poet, born in Greenfield, Ind. He began life as an itinerant sign painter and later performed in a theatrical company. His literary work began in 1875, with contributions to newspapers and magazines. Among his volumes of verse are *The Old Swimmin' Hole and 'Leven More Poems, Character Sketches and Poems, Afterwhiles, Green Fields and Running Brooks, Armazindy, A Child World, An Old Sweetheart of Mine, Rhymes of Childhood* and the *Book of Joyous Children.* Riley's child poems reveal a true understanding of childhood, and his Indiana dialect poems are full of humor, pathos and genuine knowledge of Indiana life.

JAMES WHITCOMB RILEY

Rin'derpest or **Cattle Plague,** an infectious disease of cattle which affects the digestive organs. It is unknown in the United States, but is generally prevalent in Russia, Austria and some other parts of Europe and central Asia. Rinderpest is one of the oldest of cattle diseases and was probably introduced into Europe as early as the beginning of the Christian era. It is infectious and is conveyed from one country to another by means of cattle afflicted with it or through infected hides, wool and food. The cause of the disease is a minute organism or microbe (See Bacteria and Bacteriology), which is so small that it is very difficult to discover, though experiment has proved that it is withheld by the finest of bacterial filters. The disease probably originated in Asia, whence it has spread to other parts of the world.

The first sign of the disease is a high fever, which often reaches as high as 107°, with an increase in the number of pulse beats. The animal becomes weak, the head droops and often is rested on some object for support. The back is arched, and the forelimbs are brought together under the body. As the disease progresses the digestive and respiratory organs are strongly affected, the mucous membrane of the mouth, throat and other passages becoming red, and discharges of mucus, accompanied by a cough, occur. The eyes are also affected and discharge a viscid secretion. In severe cases death ensues in from four to seven days.

If the internal organs of the animal are examined after death, the mucous lining of mouth and pharynx is found to be covered with red spots, over which there are occasional gray, cheesy patches, which on removal expose ulcers. These patches are also found in the fourth stomach and the small intestines, while the third stomach is usually filled with dry, hard food.

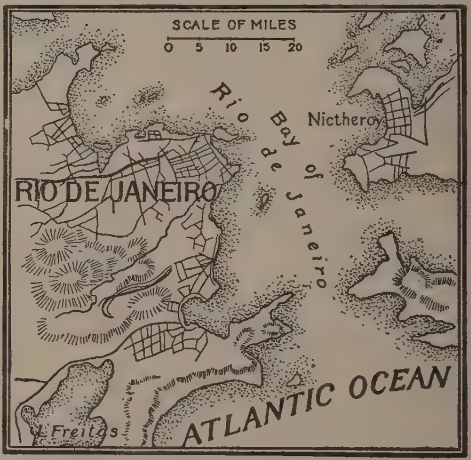
The disease is usually fatal, and no remedy has been found that will prevent its ravages when once it has secured a hold upon the animal, though it can be very largely prevented by inoculation with serum prepared for this purpose. This method is generally used in Russia, South Africa and the Philippine Islands. The animals afflicted should be killed, and the carcasses should be disposed of in the shortest possible time. Stables, yards and anything used about or near the affected animal should be thoroughly disinfected.

Ring, an ornament of gold or other metal, worn on the finger. Rings have been in use since the most ancient times. The form worn in early times was the signet ring, which was used as an emblem of authority and was a sign of confidence and favor. Rings were also worn as ornaments, and the Hebrews and Persians employed precious stones in setting them. The use of the betrothal and wedding rings was probably derived from the Jews. The ring is worn on the left hand, to denote a wife's subjection to her husband, and on the third finger, because from it a vein is supposed to go direct to the heart. A ring appears from an early period to have been an important feature in the coronation of kings and in the consecration of bishops.

Many uncivilized people wear rings to adorn the nose, ears, arms and toes. Besides the uses already mentioned, rings have been worn as talismans and charms against evil. Before the invention of coinage, rings were used as money, and even to-day copper rings are common among African traders.

Ringworm, a disease of the hair bulbs and the outer covering of the skin. It is caused by a minute fungus, which lives upon the tissues and is very contagious. It usually appears on the scalp and first shows itself by the loss of color and brittleness in the hair, which soon falls out, leaving bald patches, sometimes an inch or more in diameter. A treatment which will destroy the fungus will cure the disease.

Rio de Janeiro, *re'o da zha nay'e ro,* the capital of Brazil and second largest city of South America, situated on the west side of the entrance of the Bay of Rio de Janeiro. The bay is surrounded by mountains whose sides are covered with verdure, and this setting gives the city a remarkably picturesque site. The city extends along the bay for about 15 miles, and a number of spurs of the mountains enter within its limits. Like most Spanish cities, it contains a number of squares, or plazas, around which the important buildings are grouped. The chief of these is surrounded by the city hall, the Senate house, the mint and other public buildings, and it is near the imperial palace formerly occupied by the emperor. In the older part of the town the streets are narrow and irregular. This is the commercial section and contains the most important buildings, such as the customhouse, the postoffice, the exchange, the Hospital of Santa Casa da Misericordia, the National Academy of Fine Arts, the museum and the polytechnic institute. The public arsenal and theaters are also in this section. The leading educational institutions include the military and naval schools, the Hydrographic Institute, historical



and geographical societies, the national library, with over 250,000 volumes, numerous schools of medicine and surgery and a national conservatory of music.

Rio de Janeiro is one of the chief commercial ports of South America and is noted for its shipments of coffee, which exceed those of any other city. It has regular steamship communication with the leading ports of the United States and Europe. It is also connected by railway with surrounding towns and the rich agricultural districts in its immediate vicinity. The manufactures are comparatively unimportant. Chief among them are textiles and flour and grist mill products.

The place was first settled by the French in 1555, but two years later they were dispossessed by the Portuguese, who in 1567 founded the city. In 1640 it was captured by the Dutch, and about 1750 it became the capital of Brazil. From 1808 to 1821 it was the residence of the king of Portugal. Population in 1900, estimated at 750,000.

Rio Grande. See Vermejo.

Rio Grande or **Rio Grande del Norte,** a large river of the United States, which rises in southwestern Colorado and flows generally southeastward into the Gulf of Mexico, forming on its way the entire boundary between Texas and Mexico. Its length is about 1800 miles. It is for the most part a shallow stream, but small steamboats can ascend for nearly 500 miles. For a part of its length it is dry during a portion of the year. Its chief affluent is the Rio Pecos.

Rio Negro, *re'o na'gro,* a river of South America; it rises in the southeastern part of Colombia, flows south into Brazil, then flows southeast and unites with the Amazon. It is the largest tributary of the Amazon from the north, and it is connected with the Orinoco by the Cassiquiari. The chief tributaries are the Branco, from the north, and the Yaupe, from the west. The main river has a length of 1400 miles.

The name is also given to a smaller river of Colombia, which is a tributary of the Meta; also, to a river of Uruguay, which joins the Uruguay River 80 miles north of Buenos Ayres. This stream is about 300 miles in length.

Ri'ot, a disturbance of the public peace, attended with circumstances of tumult and commotion, as where an assembly destroys, or in any manner damages, seizes or invades private or public property or does any injury whatever by actual or threatened violence to the person of individuals. By the common law a riot is an unlawful assembly of three or more persons, which has actually begun to execute the purpose for which it assembled, by a breach of the peace and to the terror of the public. A lawful assembly may become a riot if the persons assembled form and proceed to execute an unlawful purpose to the terror of the people, although they had not that purpose when they assembled. Punishment for riot is regulated by statute.

Ripa'rian Rights, the legal rights of land owners whose property contains or borders upon a water course. By the common law the owner of land adjacent to non-navigable streams owns the bed of the stream to its center and has the right to a reasonable use of the waters. However, he cannot use all the water, even though he allows it to pass on without waste or pollution. Neither can he divert the stream or pollute the waters so as to interfere with the rights of other land owners farther on in its course.

Rip'ley, George (1802–1880), an American author, born at Greenfield, Mass. Educated at Harvard College and Cambridge Divinity School, he became a Unitarian minister in Boston, was one of the founders of the Transcendental magazine, the *Dial,* and one of the originators of the communistic experiment at Brook Farm. He became literary editor of the New York *Tribune* in 1849 and was joint editor, with C. A. Dana, of the *New American Cyclopaedia.*

Ripple Marks, the wavy or ridgy marks left on the beach of the sea, lake or river by ripples or wavelets. Such marks have often been preserved when the sand has hardened into rock, and are held by geologists as indications that the formation of the beds in which they occur took place on the sea shore or at a depth not greater than sixty feet. Wind ripple marks and current ripple marks are also sometimes found in rocks.

Rip Van Win'kle, the hero of Washington Irving's delightful sketch. He is an idle, good-natured, henpecked scapegrace, who neglects his patch of maize and potatoes in a small village near the Hudson River, and who, with his gun and dog Wolf, his companion in idleness, seeks a refuge from the scolding tongue of his sorely-tried, but termagant, wife in the forests of the Catskill Mountains. There he falls in with Hendrick Hudson and his crew of the *Half Moon,* who are playing at ninepins in a secluded hollow, the balls as they roll echoing along the mountains like rumbling peals of thunder. Rip is directed to wait on them, and while doing so he tastes again and again of the liquor he hands, till his senses forsake him. He wakens on a bright summer morning to find his dog gone, a rusty firelock by his side, and his beard a foot long. When he returns to the village, he finds new buildings, new names over the doors, new faces at the windows. His own house is fallen into decay, his wife is dead—there is a drop of comfort, at least, in this intelligence—and he who went away a subject of George the Third has returned to find himself a free citizen of the United States. His sleep, he discovers, has lasted twenty years, and meantime the American Revolution has passed and left all things changed. Rip, however, is recognized by some of his old cronies, finds a home at his daughter's house, and for many more years is as comfortable at the door of the new wooden Union Hotel as ever he was at old Nicholas Vedder's quiet Dutch inn. The story has been often dramatized in America, but no version has held the stage except Boucicault's, with which the name of Joseph Jefferson is identified.

Ristori, *re sto're,* Adelaide (1822–1906), an Italian actress, the daughter of strolling players. She made her début when very young, won favor, especially, as Francesca da Rimini, and before she was twenty was recognized as the foremost Italian actress of her time. In 1847 she was married, and she withdrew from the stage for two years. For a time during the French siege of Rome she served as a nurse in the hospitals. Ristori's greatest rôles were Mary Stuart, in Schiller's drama of the same name, and Elizabeth, in the play by Giacometti.

Rit'ualism, a strict adherence to rites and ceremonies in public worship. The term is more especially applied to a series of changes introduced by clergymen of the High Church party into the services of the Church of England. These changes are in the direction of a more ornate worship, and the infusion into outward forms of a larger measure of the symbolic element.

Riu-Kiu, *re'u ke'u,* **Lu-Chu, Liu-Kiu, Liu-Chiu.** See Loo-Choo.

River, a large stream of water, flowing through the land. A river system includes the main stream and all of its branches, which are called tributaries. The Mississippi with its tributaries affords an excellent illustration of a river system. The area drained by such a system is called the *basin* (See Basin). The height of land dividing the rivers of one system from those of another is known as a *watershed,* or *divide.* Rivers have their beginning in raindrops. As the rain falls upon the earth, a portion of it soaks in and forms ground water, some of which again appears in springs and rivulets. Another portion runs down the slopes, forming rills, which, as they join each other, form creeks and finally unite in the main stream of the valley. This is known as the river, though it may be small. The rivers carry water to the sea, whence it is returned to the land by evaporation and rainfall (See Rain; Wind). In mountainous regions, snow and ice constitute important sources of rivers. During the summer they are constantly melting, and in arid regions they supply streams with a flow of water during the dry season.

The form and size of the river channel depend upon the size of the stream and the degree of slope. The steepest slope is usually in the upper part of the channel, where the stream and its tributaries have great velocity and consequently great force, often sufficient to enable them to remove from their bed all but the heaviest rocks. In this part of the course the channel is narrow, with steep banks, and usually free from bends. In the lower course the character of the stream changes. The more gentle slope deprives the current of much of its power of erosion and transportation, and the coarsest matter brought down from the upper part of the course is deposited along the banks and on the bed of the stream, usually covering them with gravel and coarse sand. It is in this part of the stream that rounded pebbles are found in large quantities. The deposit of this matter fills up the bed of the stream and widens the channel. The lessened velocity also gives lower banks, with gentler slopes, but the current still has sufficient velocity to carry the finest silt to still lower levels, where it is deposited along the banks or at the mouth of the river (See Alluvium; Delta). In the middle and lower part of its course, the river may be very crooked, since only slight obstacles are necessary to turn the current from its direction. Wherever the river runs over a precipice or a rapid declivity, rapids or falls are formed (See Cataract). The mouth of the river depends upon the velocity of the current and the condition of currents and waves in the sea at the confluence. If the river is broad and flows into the sea where it is agitated by strong winds or high tides, the silt brought down is carried away and the mouth is a broad estuary, such as that of the Saint Lawrence; if the velocity of the current is not great and at the point of confluence the sea is comparatively quiet, the silt is deposited where the current loses its velocity, and in the course of time large, low plains, called deltas, are formed. The deltas of the Nile and the Mississippi are good illustrations of these formations.

Riverside, CAL., the county-seat of Riverside co., 65 mi. e. of Los Angeles, on the Santa Ana River and on the Southern Pacific, the Atchison, Topeka & Santa Fé and other railroads. The city is noted for its beautiful streets, drives and public parks, and it has a number of hotels that accommodate many winter visitors. It is in one of the richest orange-growing sections in the world, while lemons, grapes, figs and other fruits are also cultivated. There are two libraries, twelve churches, a fine courthouse, the Sherman Institute, good public schools and several private schools. The place was settled in 1870 and the city was incorporated in 1886. Population in 1900, 7973.

River Tortoise, the name of a family of tortoises that are aquatic in their habits, coming to shore only to deposit their eggs. They are exclusively carnivorous, living on fishes, reptiles and birds. Well-known species are the *soft-shelled turtle* and the large and fierce *snapping turtle* of America. They inhabit almost every river and lake in the warmer regions of both hemispheres and are particularly plentiful in the Ganges, where they prey on human bodies.

Rives, *reev,* AMÉLIE, Princess Troubetskoy (1863–), an American author, born in Richmond, Va. Her first work which appeared in book form was produced in 1888 and was entitled *A Brother to Dragons*. Her later writings include *Virginia of Virginia*; *The Witness of the Sun*; *According to Saint John*; *The Quick or the Dead*, her most popular novel; *Athelwold*, and *Tanis, the Sand-Digger*. She was married in 1888 to John Armstrong Chandler, from whom she was divorced several years later. In 1896 she married Prince Pierre Troubetskoy.

Rizzio, *reet'se o,* DAVID. See MARY STUART.

Road, *rode,* an artificial pathway for the accommodation of travelers and the transportation of commodities through a country. Of all the ancient nations, the Romans were the best road builders, and some of their public highways were so well constructed that portions of them are still in use. But from the decline of the Roman Empire until after the middle of the eighteenth century, the roads of most of the countries of Europe were in a very poor condition. France took the lead in improving her highways, and other countries followed her example, so that, with the exception of certain portions of Russia and some of the smaller countries in the southeastern part of Europe, the roads of Europe are now in excellent condition.

Roads in the United States in general are in much poorer condition than in Europe. This is due to two causes—the vast extent of territory and rapid settlement of new states, and the system of road making and repairing, which places the construction of highways almost entirely within the jurisdiction of local authorities. The United States government has charge of the roads in national parks, but with this exception it has constructed only one public highway—the National, or Cumberland, Road, extending from Cumberland, Md., to Vandalia, Ill. (See CUMBERLAND ROAD). Most state laws place the construction of the roads in charge of the county, the township or a still smaller division, known as a road district. In the mountainous and hilly regions the condition of the soil is such that comparatively good roads can be constructed without placing other material on them, but in the states occupying the great prairie region of the Mississippi Basin, the soil is of such nature that good roads cannot be made without surfacing them with some other material.

In the construction of a road, the following points should receive careful attention:

(1) The location of the road, so as to have it connect within shortest distances the points between which it extends, provided this can be done without incurring steep grades. In mountainous and hilly countries, most careful engineering is often necessary to locate a road so as to avoid grades that are a great hindrance to the hauling of heavy loads.

(2) The shaping of the roadbed. The earth upon each side is usually plowed and scraped onto the roadbed, where it is given a rounded surface, either by means of a road machine, called a *grader*, or by hand labor.

(3) Surfacing. In some localities the ordinary earth road is serviceable, but it is usually covered with dust during dry weather and with mud during wet weather. For these reasons earth roads are greatly improved by surfacing them with gravel or crushed stone. This material should be pressed down onto the road by a heavy steel roller. It protects the surface, allows the hauling of heavy loads and renders the roadbed much more durable; hence, although surfacing is attended with considerable expense, it is economical.

There are very few surfaced roads in the

United States, and many rural sections, during certain portions of the year, are practically deprived of means of transportation. Since 1890, however, there has been a growing sentiment throughout the country in favor of better roads. This originated with the wheelmen, at the time that bicycling was at its height. Through their efforts, the National Good Roads Association was formed, and through the influence of this association and various state organizations, a division of road inquiry was established in the department of agriculture. This division gives careful attention to the most suitable material for road construction in different localities, and each year it sends through portions of the country a "Good Roads Train," which is a railway train, equipped with the most approved roadmaking machinery and in charge of experienced road engineers. This train stops at frequent intervals, and a short piece of road is constructed, thus giving an object lesson to the local authorities on the art of roadmaking.

Road Runner, a curious bird, with a tail about a foot long. It is known in southwestern United States as the *snake killer* or *chaparral cock.* Its general color is of a copper or bronze-green, almost everywhere streaked with white or tawny. Its head is a dark steel-blue. The road runner uses its wings in running and is said to be able to keep up with the fastest horse.

ROAD RUNNER

Ro'anoke', Va., a city in Roanoke co., 53 mi. w. of Lynchburg, on the Roanoke River and on the Norfolk & Western railroad. It has a picturesque location near the Blue Ridge Mountains. It is the seat of Virginia College for women; Hollins Institute, a large female college, is six miles north of the city. The city also has a business college, an academy of music, a good high school, a courthouse, a city hall and numerous fine business blocks. There are electric street railways, electric lights, a good sewer system and two waterworks plants. Roanoke was formerly a great tobacco market, but it is now more important as an iron-manufacturing center. It contains rolling mills, car and locomotive works, tobacco factories, bottling works, knitting mills and other factories. The city was incorporated in 1884. Population in 1900, 21,495.

Roanoke River, a river in the northwestern part of North Carolina, flowing northeast into Virginia, then east and southeast and entering the ocean through Albemarle Sound. It has a length of 240 miles and is navigable for steamboats for about 75 miles; small boats may ascend farther.

Rob'bery, a forcible taking away of another man's property from his person or from under his personal protection, by violence or by intimidation. Violence or intimidation is the criterion which distinguishes robbery from other larcenies; and it is sufficient that so much force or threatening, by word or gesture, is used as might create an apprehension of danger of suffering personal violence and might lead a man to part with his property against his will. The punishment is now usually imprisonment for long periods. *Highway robbery,* or the forcible taking of property from travelers, in many countries is a capital offense, and in all civilized countries it is severely punished. See Larceny.

Rob'bia, Della, the name of a famous family of Italian sculptors of Florence. The best known member was Luca della Robbia (1399–1482). He was distinguished for his work in both marble and bronze, as well as for his reliefs in terra-cotta, coated with an enamel which protected his work from atmospheric injury. The fame of this new decorative work soon spread through Italy and all over Europe, and his orders were innumerable.

Andrea Della Robbia was a nephew of Luca. He is especially famous for his colored reliefs in terra-cotta, for Santa Maria delle Grazie, the Cathedral of Arezzo and the loggia of the Hospital of the Innocents, in Florence.

Robert II (1316–1390), king of Scotland, the son of Marjory, daughter of Robert Bruce, and of Walter, steward of Scotland. He was thus the first of the *Stuart* kings. He was recognized by Parliament in 1318 as heir to the crown, and on the death of David II he was crowned at Scone in 1371. He took little part in the wars with the English, his barons conducting the campaigns. The most memorable part of the struggle with England was the Battle of Otterburn.

Roberts, David (1796–1864), an English painter, born in Edinburgh. After a seven years' apprenticeship, he became a scene painter, and in 1821 he was engaged as painter for Drury Lane Theater. Later he traveled in Europe and the East, and in 1841 he was made a member of the Royal Academy. His *Destruction of Jerusalem*, the *Inauguration of the Exhibition of all Nations*, *Rome* and *Saint Peter's at Rome* are some of his best-known works. In 1859 he published an illustrated volume, entitled *Italy—Classical, Historical and Picturesque*, and at the time of his death he was engaged on a series of views of *London from the Thames*. Roberts is considered the best architectural painter Great Britain has produced, and as a painter of interiors he has few equals.

Robertson, Frederick William (1816–1853), a celebrated preacher, born in London. He became curate of Trinity Chapel, Brighton, in 1847 and continued in this charge with increasing fame as a preacher till his death. His views on the Sabbath, the atonement, baptism and inspiration were assailed as unorthodox, and he was accused of preaching democracy and socialism. The workingmen were very devoted to him. They placed a bronze medallion on his monument in the cemetery at Brighton.

Robertson, James (1742–1814), an American frontiersman and soldier, born in Brunswick County, Va. He was taken in infancy to North Carolina and in 1770, in company with Daniel Boone, crossed the Alleghanies into Tennessee, being one of the founders of the Wautauga Association. He became a leading spirit in the settlement, was conspicuous in operations against the indians and in 1778, with Richard Henderson, founded Nashville. When Tennessee became a territory in 1791, Robertson was made brigadier general of the western district. After the admission of the state to the Union, he was in the state legislature and afterward negotiated with the indians for the cession of a large part of their land.

Robespierre, *robe spe air′*, Maximilien Marie Isidore (1758–1794), a French revolutionist. He was educated at the College of Louis le Grand at Paris, practiced as an advocate at Arras, his native town, and held for a short period the position of criminal judge, which he resigned because he would not pronounce a death sentence. In 1789 he was elected deputy to the States-General, and he was a zealous supporter of democratic measures, becoming a prominent member of the Jacobin and other revolutionary clubs. By the close of 1791 he had become one of the most popular of the revolutionists, and he was from the first the leader of the radicals in the National Convention. In the proceedings against Louis XVI he distinguished himself by his opposition to every proposal to avert or delay the fatal result. By the help of Danton and his followers he brought about the downfall of the Girondists and later of the followers of Hébert, who were carrying the Reign of Terror farther than seemed right to Robespierre. Shortly afterward he caused Danton to be arrested and guillotined. Robespierre's power now seemed to be completely established, and the Reign of Terror was at its height; but although his name more than any other has always been connected with the Reign of Terror, his authority was by no means absolute. Robespierre was a theorist, working toward an ideal state of society, and he felt that the excesses of the Terror were the only means by which that state could be established. His power aroused alarm in the Convention, a party was formed against him and in July, 1794, he was openly accused of despotism. A decree of arrest was carried against him, and he was thrown into Luxemburg prison. He was released by his keeper on the night of the same day and was conducted to the Hall of Commune, where his supporters were collected. On the following day Barras was sent with an armed force to effect his arrest. Robespierre's followers deserted him, and he was guillotined on July 28, 1794, together with some twenty-three of his supporters.

Rob′in, or, familiarly, Robin Redbreast, a name given to quite different song birds in Europe and the United States. In European countries the robin is a small thrush, whose cheerful song is a great favorite, and whose friendly ways make it known even at the doorside and in busy places. The American robin is a larger bird, whose song is not especially fine, but whose sociability and friendliness make it a welcome visitor. It feeds upon worms and insects, but also on cherries and other small fruit to such an extent that horticulturists are not apt to favor it. The principal parts of the bird are olive-gray, the head and tail, blackish, and the chest, chestnut or red. It builds a strong nest of hay and mud and lays from four to six greenish-blue eggs. See BIRDS; *color plate, Eggs.*

Robinson, EDWARD (1794–1863), a biblical scholar and explorer of the Holy Land, born at Southington, Conn. He graduated at Hamilton College, Clinton, N. Y., and for several years was instructor in Hebrew in Andover Theological Seminary. In 1826 he went to Europe, studied at Göttingen, Berlin and Halle and returned in 1830 to his native country, where he was given the chair of biblical literature at Andover, which he resigned in 1833. As the result of a visit to the Holy Land in 1837, he wrote his great work, *Biblical Researches in Palestine, Mount Sinai and Arabia Petraea,* which he added to, after a second visit to Palestine in 1852. He also wrote a physical geography of the Holy Land. In 1840 he began his work in biblical literature at Union Theological Seminary, New York, a position he held till his death. His second wife, Therese Albertine Louise von Jakob (1797–1870), was known as an author before her marriage, under the name of Talvi. In 1822 she published translations of *Old Mortality* and the *Black Dwarf* in German, later *Volkslieder der Serben* and a few tales under the *nom-de-plume* of Psyche. She also wrote a *Review of the Slavic Languages, Characteristics of the Popular Songs of the German Nations* (1840), and several novels, and she contributed to magazines, both German and English.

Rob'inson Cru'soe, a celebrated romance by Defoe, published in 1719. The story is supposed to be founded on the experiences of Alexander Selkirk, who was shipwrecked on an uninhabited island and obliged to remain there for years. The accounts of the shifts to which Crusoe was forced to resort, his ingenuities and his inventions, are given in Defoe's most realistic style, and this first novel has retained much of its original popularity to the present day.

Rob Roy (1671–1734), a celebrated Highland freebooter, whose true name was Robert Macgregor, but who assumed his mother's family name, Campbell, an account of the outlawry of the clan Macgregor by the Scotch parliament. Like other Highland gentlemen, Roy Rob was a trader in cattle previous to the rebellion of 1715, in which he joined the adherents of the Pretender. On the suppression of the rebellion, the duke of Montrose, with whom Rob Roy had previously had a quarrel, took the opportunity to deprive him of his estates; and the latter began to indemnify himself by making constant war on the duke and carrying off his cattle. Garrisons were stationed in the vicinities where his raids took place; but his activity and courage saved him from the hands of his enemies, upon whom he continued for some time to levy blackmail.

Roc, a fabulous bird, mentioned in the *Arabian Nights Entertainments,* of such size and strength that it could carry off an elephant. A belief in it was common in Europe during the Middle Ages, having been brought from the East, probably as a consequence of the Crusades.

Rochambeau, *ro shahN bo',* JEAN BAPTISTE DONATIEN DE VIMEUR, Count de (1725–1807), a marshal of France. He studied for the priesthood, but entered the French army in 1742, fought in the War of the Austrian Succession and distinguished himself in the Seven Years' War. In 1780 he was sent with French forces to aid the colonists in America, and he rendered valuable assistance during the siege of Yorktown. On his return he became governor of Artois and Picarde and subsequently of Alsace; was made a marshal in 1790, and commanded the Army of the North in 1792. During the Reign of Terror he narrowly escaped the guillotine. Napoleon restored him to his former rank.

Rochefort, *roshe for',* a fortified seaport and naval arsenal of France, situated on the Charente River, 9 mi. above its mouth and 20 mi. s. s. e. of La Rochelle. The place contains extensive shipyards, workshops and storehouses for naval supplies; also, a large naval hospital and medical school. Shipbuilding is the chief industry. Population in 1901, 30,824.

Rochefort, VICTOR HENRI, Count de Rochefort-Lucay (1830–   ), a French journalist, dramatist and politician. On the death of his father, in 1851, he obtained a post in a government office. In 1859 he wrote for the *Charivari,* and later he became one of the principal writers on the *Figaro.* Having been dismissed from the latter post by order of the government, he founded a weekly paper, called *The Lanterne,* in which he vigorously attacked the emperor and the ministry. In 1869 he was returned to the legislative assembly. He then started a new paper, *The Marseillaise,* and for its attacks on the imperial family he was sentenced to six months' imprisonment. After Sedan he became a member of the government of national defense. He fled from Paris in May, 1871, but was arrested by the Versailles government and sentenced to transportation to New Caledonia. He escaped in 1874, and after the general amnesty of 1880 he returned to Paris, where he founded his new journal, *The Irreconcilable.* He was returned as deputy by the Department of the Seine, but resigned his seat in 1886. Later he was identified with the movement in support of General Boulanger, was exiled in 1889, but was allowed to return to Paris in 1895.

Rochefoucauld, *rohsh foo ko′.* See La Rochefoucauld.

Roch′ester, Minn., the county-seat of Olmsted co., about 92 mi. s. e. of Saint Paul, on the Zumbro River and on the Chicago & Northwestern and the Chicago Great Western railroads. The city is in a rich agricultural region, where wheat and live stock are the principal products. There are large grain elevators, stockyards, flour mills, a foundry, machine shops and other establishments. The prominent buildings include the Masonic Temple, Odd Fellows' building, Saint Mary's Hospital, a convent, an opera house, a courthouse and a city hall. A state hospital for the insane is located here, and the city has three banks, three daily papers and five weekly papers. In 1883 a cyclone caused the death of 27 persons and the loss of considerable property. The place was settled in 1854, and the city was chartered four years later. Population in 1905, 7233.

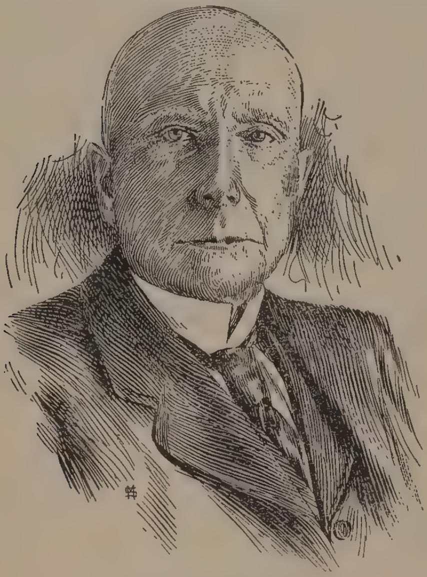
Rochester, N. H., a city in Strafford co., 35 mi. n. e. of Manchester, on the Cocheco River and on several lines of the Boston & Maine railroad. The river furnishes good water power, and there are various manufacturing establishments, including shoe factories, woolen mills and brick works. The city has a public library, Gaffney Home for the Aged, thirteen churches, a high school and a commercial college. It was settled about 1728 and was chartered as a city in 1891. Population in 1900, 8466.

Rochester, N. Y., the county-seat of Monroe co., and third largest city of the state, is situated on the Genesee River, 70 mi. e. of Buffalo, 229 mi. w. of Albany and 8 m. s. of Lake Ontario, on the New York Central, the West Shore, the Erie, the Lehigh Valley, the Pennsylvania, the Buffalo, Rochester & Pittsburg and other railroads. The Genesee River passes through the city from north to south and divides it into two nearly equal parts. The river here has worn a gorge, which in some places exceeds 200 feet in depth, and descends to the lake level in a series of three falls. The principal cataract, which has a descent of 96 feet, is situated near the center of the city. The river is spanned by ten bridges and a stone aqueduct, which carries the Erie canal. The central bridge is of stone and is lined on both sides with stores. The others are open, and from them a fine view of the river gorge can be obtained. The city has fourteen parks, three of which, the Genesee Valley, the Seneca and the Highland, are of considerable size, while the others are small. In all, the park area includes 666 acres. The city is well laid out, and the streets are wide. The public buildings of importance are the courthouse, the city hall, the postoffice, the Chamber of Commerce, the Powers Hotel, the Masonic Temple, the state arsenal, the Genesee Valley Clubhouse, the Wilder building, the Granite building and the German-American building, besides a number of large and well-built business blocks. The educational institutions include the University of Rochester, the Rochester Theological Seminary, Saint Bernard's Seminary (Roman Catholic), the Wagner Memorial College, and the Mechanics' Institute, an industrial school which has an enrollment of over 4000 students. The libraries include the Reynolds Public Library of 50,000 volumes, the Seneca Library and the law library. Among the charitable institutions of importance are the Western New York Institution for the Deaf, the state industrial school, a state hospital for the insane, the county almshouse and a number of hospitals and asylums maintained by religious denominations. The Monroe County penitentiary is also located here.

Rochester is an important manufacturing city, and its prosperity is due largely to the great water power furnished by the Genesee River. Chief among its industries are the manufactures of cameras and photograph supplies and of optical instruments. It is the fourth city in the country in the manufacture of boots and shoes and the first city in the canning of fruit. The manufacture of clothing is extensive. Other industries include machine shops, furniture factories, agricultural implement works, wagon factories and breweries. Formerly the city was the foremost in the Union in the manufacture of flour, but with the development of the great wheat fields in the northwest, this industry declined. Other industries in which Rochester leads the country, and in some respects the world, are its nurseries and its trade in garden seeds, fruits and plants.

The place was first occupied by white men in 1788, but the first actual settlement did not take place until 1810. Seven years later the village was incorporated, and in 1834 it became the city of Rochester. Its growth has been steady. Population in 1905, 181,666.

Rock'efeller, John Davison (1839–), an American capitalist, born in Tioga County, N. Y. He was educated in the public schools of Cleveland, Ohio, and at the age of nineteen he entered the commission business on his own account. He was engaged in the oil business in Cleveland, Ohio, at the age of twenty-one, and in 1870 he became president of the Standard Oil Company, which was consolidated with other concerns in 1882, forming the Standard Oil Trust. This was dissolved ten years later, the constituent corporations being managed separately, though all are under the direction of Mr. Rockefeller. He was the founder of the new University of Chicago, his endowments amounting to more than $10,000,000; he also has given liberally to Vassar College, to Baptist mission boards and churches and to other institutions. In 1905 he gave $10,000,000 to a general education board and $1,000,000 to Yale University.


JOHN D. ROCKEFELLER

Rockefeller, William (1841–), an American capitalist, born in Tioga County, New York, brother of John D. Rockefeller. After being engaged for a time as a commission merchant, he joined his brother in the oil business, and after 1865 he had charge of the New York offices of the various corporations which, in 1882, formed the Standard Oil Trust. He also invested largely in mining companies, municipal lighting works and railways, having a large interest in some of the most important lines of the country, including the Chicago, Milwaukee & Saint Paul, the Lake Shore & Michigan Southern, the New York Central & Hudson River, the Northern Pacific and the Delaware, Lackawanna & Western. He also became a director in many important banking institutions, including the National City Bank, the Hanover National Bank, the Leather Manufacturers National Bank and many other corporations.

Rock'et, a projectile consisting of a pointed cylinder filled with inflammable material, the burning of which drives the rocket through the air. Rockets were first used in Eastern countries. Congreve first made them of iron and introduced them into the British service, under the name of Congreve rockets. They were kept point first by the use of a stick, which acted on the principle of an arrow's feathers. Rockets may be discharged from tubes or troughs or even when lying on the ground. In war, rockets are chiefly used for incendiary purposes, for moral effect and for various irregular operations. *Signal* and *sky*-rockets are small rockets formed of pasteboard cylinders, filled with combustible materials, which, when the rocket has attained its greatest height and has burst, cast a brilliant light, which may be seen at a great distance.

Rock'ford, Ill., the county-seat of Winnebago co., about 85 mi. n. w. of Chicago, on the Rock River and on the Chicago, Burlington & Quincy, the Illinois Central, the Chicago & Northwestern and other railroads. The city is surrounded by an agricultural region and has a beautiful location on both sides of the river. The streets are regularly laid out, and there are many fine residences. Some of the prominent buildings are the memorial hall, the courthouse, the city hall, two hospitals and the Carnegie library. The city is the seat of Rockford College for women, and it has a good high school, a parish school and a business college. A dam across the river affords water power for numerous manufacturing establishments. The products include agricultural implements, furniture, pumps, watches, silver-plated ware, paper, flour, grape sugar and various other goods. It was settled in 1834 and was chartered as a city in 1852. Population in 1900, 31,051.

Rock Hill, S. C., a city in York co., 25 mi. s. w. of Charlotte, N. C., on two lines of the

Southern railroad. It is in a cotton region and contains cotton mills, cottonseed oil mills, a carriage factory, a flour mill, brick works and other factories. Electrical power is developed on the Catawba River, five miles distant. The Winthrop Female College and the Catawba Military Academy are located here, and the city has street railways and waterworks. Population in 1900, 5485.

Rocking Stones, large blocks of stone, poised so nicely upon the point of a rock that a moderate force applied to them causes them to move backward and forward. Sometimes a rocking stone consists of an immense mass, with a slightly rounded base, resting upon a flat surface of rock below, so that a single person can move or rock it. Some rocking stones are evidently artificial, having had a mass of rock cut away round the center point of their bases; others are due to natural causes, such as decomposition and the action of wind and water.

Rock Island, ILL., the county-seat of Rock Island co., 180 mi. w. by s. of Chicago, on the Mississippi River, opposite Davenport, Iowa, on the Hennepin Canal and on the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & Saint Paul and other railroads. The city is an important railroad center and has extensive commercial interests. A large United States arsenal and armory is on the island of Rock Island, between the two cities. A large combination railroad and wagon bridge has been constructed by the Chicago, Rock Island & Pacific railroad and the United States government, from the city to the island and thence to Davenport. Another bridge connects the island with the city of Moline. The river between the island and Davenport is navigable, while the Federal government has constructed a dam on the Rock Island side. This supplies extensive water power for manufacturing, and the principal establishments are plow works, lumber mills, railroad shops, oilcloth works, a brewery, the arsenal and various other factories. Augustana College is located here, and the city has a good high school building and the Saint Anthony Hospital. The place was settled in 1836, and the city was chartered in 1849. Population in 1900, 19,493.

Rock'land, ME., the county-seat of Knox co., 60 mi. s. of Bangor, on an inlet of Penobscot Bay and on the Maine Central railroad. There is an excellent harbor, and the city has shipbuilding yards, brickyards, carriage works, cigar factories, large lime-burning works and other establishments. There are also extensive granite quarries in the vicinity. The municipality has a public library, a good Federal building and a county courthouse. The place was a part of Thomaston until its incorporation as East Thomaston, in 1848. It was named Rockland in 1850 and was chartered as a city in 1854. Population in 1900, 8150.

Rockland, MASS., a town in Plymouth co., 18 mi. s. e. of Boston, on the New York, New Haven & Hartford railroad. It has a public library and two banks. There are several shoe factories, a large tack factory and other establishments. It was a part of Abington, of the old Plymouth colony, until separately incorporated in 1874. Population in 1905, 6287.

Rock River, a river rising in the southern part of Wisconsin, flowing south by west and entering the Mississippi, just below Rock Island, Ill. Its length is 325 miles. It flows through a broad, fertile valley, but is of little use to navigation, because of rapids. The chief towns along its banks are Watertown, Janesville, Beloit, Rockford, Dixon and Sterling.

Rocks, a term used in two senses; first, to denote the natural earthy materials which enter into the composition of the earth's crust; second, to denote large masses of such materials, compacted and solidified. In the latter sense rocks differ from stones only in size. It is with rocks chiefly in the latter meaning that the science of geology is concerned, and for classification and description of rocks, see GEOLOGY and articles therein referred to; also articles upon individual rocks.

Rock Springs, WYO., a city in Sweetwater co., about 250 mi. w. of Laramie, on Bitter Creek and on the Union Pacific railroad. It is in a mountainous region, containing extensive coal fields, and coal mining is the principal industry. The Wyoming State Hospital is located here, and the city has electric lights, waterworks, two banks, four schools, four churches, a high school, a library and numerous fine residences. Population in 1905, 5343.

Rockville, CONN., a city in Tolland co., 15 mi. n. e. of Hartford, on the Hockanum River and on the New York, New Haven & Hartford and several electric railroads. The river makes a total descent of more than 250 feet in flowing through the city, and it thus affords excellent water power. There are cotton, woolen, silk and knitting mills and envelope and other factories. The city has eight churches and a fine public library. The place was settled in the early part of the eighteenth century, but it remained a part of the town of Vernon until it was chartered as a city in 1889. Population in 1900, 7287.

Rocky Mountains, the name generally applied to the largest mountain system of North America, extending along the western part of the continent from Central America to near the Arctic Ocean. In Mexico the range is known as the Cordilleras, and in Canada, as the Canadian Rockies. In its broadest sense, the term includes all of the great mountain system west of the Great Central Plain, but in the more restricted sense, in which geographers now quite generally use the term, it means the range of mountains on the eastern border of the plateau, which, taken collectively, is called the Eastern Range. The Rocky Mountains consist of a number of ranges grouped together under various local names. The system as a whole within the United States is divided into the Northern Mountains and the Southern Mountains by the Laramie Plateau, a large level tract of land between 7000 and 8000 feet in altitude, crossing the southeastern part of Wyoming. It was over this plateau that the first transcontinental line of railway, the Union Pacific, sought the western coast. The important ranges to the north are the Bitter Root, forming a part of the boundary between Montana and Idaho; the Big Horn, in western Wyoming; the Tetons, south of Yellowstone National Park, and the Wind River Mountains, in which is Fremont Peak, 13,790 feet high.

South of the Laramie Plateau the mountains form what is generally known as the park region, which consists of a number of lofty plateaus, from 7000 to 10,000 feet in altitude, separated by mountain ranges. Of these the North, the Middle and the South parks and the San Luis Valley are the most noted, the last having an area of about 5000 square miles. Among the important ranges in the park region are the Front, or Colorado, range, forming the eastern border, the Elk, the San Juan and the Saguache ranges, all of which have large areas, with an elevation of 10,000 feet or more. Among these mountains it is estimated that there are over thirty peaks that exceed 14,000 feet in altitude. Among the best known of these are Gray's Peak, 14,341 feet high; Mount Harvard, 14,325 feet; Mount Lincoln, 14,297 feet; Long's Peak, 14,271 feet; Mount Princeton, 14,196 feet; Pike's Peak, 14,108 feet, and Mount of the Holy Cross, 14,006 feet. In addition to this group are Uncompahgre, 14,289 feet, and Mount Yale, 14,187 feet. Standing to the south and isolated from all these is Sierra Blanca, 14,465 feet high, considered by many the grandest mountain in this region. To the west of these mountains are the Wasatch Range, culminating in an altitude of 12,000 feet, and the Uintah, which extend westward from them. The plateaus enclosed by these ranges have a nearly level surface, and in general their appearance is that of a vast low plain. However, because of lack of moisture they are barren or covered with sage brush, except where irrigation has made cultivation possible.

To the south of the park region, through New Mexico and Arizona, the mountains rest upon a high plateau, which has been deeply cut by rivers, forming those wonderful canyons of such interest to geographers and geologists, chief among which is the Canyon of the Colorado (See COLORADO RIVER).

The Canadian Rockies are not as well known as those in the United States, but they contain numerous peaks of equal or greater altitude, and they are more rugged in their nature. Many of the highest peaks in this part of the range have large glaciers, in this respect closely resembling the Alps. West of the main range are the subordinate ranges, including the Gold Mountains and the Selkirks.

The general character of the Rocky Mountains is rugged. The eastern escarpment is usually higher and more abrupt than the western. In those regions where there is sufficient moisture, the sides are clothed with forests up to the tree line, but in the arid regions they are bare. The entire system is rich in minerals, and valuable deposits of gold, silver, copper and lignite are found in many places. The ores are quite extensively worked, but only a little coal has yet been mined. The ranges comprising the Rocky Mountain system are described under their respective titles. See CASCADE RANGE; COAST RANGE; SELKIRK MOUNTAINS; SIERRA NEVADA, and other similar titles. Consult Parkman's *Oregon Trail* and Shaler's *Nature and Man in America.*

Rocky Mountain White Goat, a goat-antelope, found high in the Rocky Mountain system, from California to Alaska. It is about three feet high, and in both sexes there are slender black horns curving backward. The small hoofs are also black. It has a long, silky, pure white coat, which enables it to conceal itself in the snow. It is very skilful in climbing and rapid in its movement, so that hunting it is an exciting and not always a successful pastime. It is never found in large flocks, but as the range of any animal is not very great, its paths, or trails, are often clearly beaten into the ground. Its hide commands a high price in the market, and its flesh is good eating.

Rodentia, *ro den'she a,* or **Ro'dents,** the largest order of mammals, containing more than 20 families and several thousand species, of such animals as rats, mice, squirrels and rabbits. Its members extend to all parts of the world, with the possible exception of Australia and New Zealand. Some, like the mice, are minute, while the largest is nearly as large as a hog. In general, they are furry, though sometimes they are spiny; they walk flat-footed, and their toes are armed with claw-like nails, or resemble parted hoofs. They live chiefly upon the earth, though a few are tree lovers, and some are aquatic. A few can fly. Their teeth are fitted for gnawing, and by having a very hard enamel on the outer surface, with little or none on the inner, they are kept constantly sharp. In the back part of the mouth is a cavity, in which the rodents can store substances that are being gnawed, without taking the chips into the mouth proper. Most of them are active, vigorous animals, and some have become great pests to the human family. See BEAVER; CAPYBARA; HARE; MARMOT; MOUSE; PORCUPINE; PRAIRIE DOG; RABBIT; RAT; SQUIRREL.

Rodin, *ro daN',* AUGUSTE (1840–), a French sculptor. His first piece of work was *The Bronze Age,* which attracted a great deal of attention and was at once acknowledged as the work of a master. *John the Baptist,* which followed this, was also a powerful work. It is now one of the valuable statues of the Luxembourg Gallery. Rodin also executed a number of admirable busts, the most noted of which are that of Victor Hugo and the well known *Head of a Woman* in the Luxembourg. These busts are very natural and lifelike and are marked by a lack of unnecessary details. Of his more recent works are *The Kiss* and a statue of Balzac, in the last of which he does not display his greatest powers. In all of his works he has expressed his individuality.

Roe, EDWARD PAYSON (1838–1888), an American clergyman and novelist, born in Orange County, New York. On the completion of his theological studies, he was a chaplain in the volunteer service from 1862 to 1865, and afterward he was pastor of a Presbyterian church at Highland Falls, N. Y. The great Chicago fire of 1871 furnished him with a subject for his first novel, *Barriers Burned Away,* which proved very successful. He resigned his pastorate and settled at Cornwall-on-the-Hudson in 1874, where he devoted himself to literature and the successful cultivation of small fruits. Fifteen novels came from his pen, all of which have been reprinted in Great Britain and have been widely read on both sides of the Atlantic. The best known are *From Jest to Earnest, Near to Nature's Heart, Opening of a Chestnut Burr, He Fell in Love with his Wife* and *Earth Trembled.* He is also the author of *Play and Profit in My Garden* and *Success with Small Fruits.*

Roe'buck, a European deer of small size, the adult measuring about two feet in height at the shoulders. The horns or antlers are small and are provided with three short branches only. The general body color is reddish-brown in summer and becomes a pale olive as winter approaches. These animals inhabit mountainous and wooded districts. When irritated or alarmed, they prove very dangerous adversaries and are able to inflict severe wounds with their antlers.

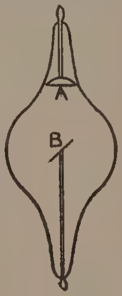
ROEBUCK

Roentgen or **Rontgen,** *rönt'gen,* WILHELM KONRAD (1845–), a Swiss scientist, born near Zurich and educated at Utrecht. In 1873 he became assistant professor of physics in the University at Strassburg. Following this, he held several other positions of importance, until, in 1879, he was elected professor of physics at

Würzburg, Bavaria. In 1896 Professor Roentgen discovered the peculiar rays which are now known as Roentgen rays, or X-rays. This discovery has given him a world-wide reputation. See ROENTGEN RAYS.

Roentgen Rays, the name given to peculiar rays, formed by the passage of an electric current through a vacuum tube, generally known as a Crookes tube (See CROOKES TUBES). The rays are named from their discoverer, Professor Roentgen, who first produced them in 1896 and gave them the name of X-rays, by which they are generally known.

The apparatus for producing Roentgen rays consists of an irregular globular tube, into each end of which a platinum wire is passed, to serve as a conductor, and from which the air has been exhausted as completely as possible. A concave disk of aluminum, *A*, is attached to the *negative*, or *cathode*, pole, and a flat disk of platinum, *B*, to the *positive*, or *anode*, pole. The platinum disk is so placed as to form an angle of 45° with the plane of the aluminum disk and is located at such a distance that the rays reflected by the aluminum disk will fall upon it in a point. When a strong current is made to pass through the tube, the cathode rays pass from *A* and strike upon *B* with such force as to raise the platinum to a red heat. It is upon this platinum disk that the Roentgen rays are produced, and they are reflected through the sides of the tube. See CATHODE RAYS.



ROENTGEN RAYS

Roentgen rays are invisible and can be detected only by their effects. Most substances opaque to light rays are transparent to these. Such are wood, paper, cloth and muscular tissue; glass and lead are opaque to them. These rays can not be reflected or refracted like rays of light or heat, neither can they be turned from their course by the influence of a magnet, like the cathode rays. While the Roentgen rays produce no effect upon the eye, they affect a sensitive photographic plate, and photographs can be taken by means of them.

Certain substances, such as compounds of barium, calcium and platinum, become self-luminous or fluorescent when exposed to cathode rays, and in a dark room they give off light of a peculiar color. If an object is placed between a screen coated with a fluorescent substance and an X-ray tube, its shadow appears upon the screen, provided it is opaque to these rays. Objects containing several substances show shadows of different degrees of darkness. For example, if the hand is placed between the screen and the tube, a mere outline of the muscular tissue will appear, while the bones will form a dark shadow, so that the skeleton of the hand is distinctly seen. A ring on the finger will give a still darker shadow than the bones. A pencil with a metallic head shows the head and the lead core, but not the wood encasing it. See FLUOROSCOPE.

The peculiar properties of Roentgen rays make their use valuable to physicians for detecting the condition of broken bones, locating objects that have entered the body, such as bullets and needles, and occasionally for studying the action of the heart, since by use of a sufficiently powerful apparatus a shadow of the entire human skeleton can be produced and even the beating of the heart can be seen. Caution should be exercised in using X-rays, since any tissue is injured by too long an exposure to them.

Roga'tion Days, the Monday, Tuesday and Wednesday before Holy Thursday, or Ascension Day, so called from the supplications or litanies which were appointed in the Roman Catholic Church to be sung or recited in public procession by the clergy and people. In England, after the Reformation, this practice was discontinued, but it survives in the custom (observed in some places) of perambulating the parish boundaries.

Rogers, *roj'urz*, HENRY WADE (1853–), an American lawyer and educator, born in Holland Patent, N. Y. He graduated from the University of Michigan at the age of twenty-one, was admitted to the bar in 1877 and was a member of the law faculty of the University of Michigan in 1883. Two years later he was made dean of the law school. In 1890 he was chosen president of Northwestern University, but resigned in 1901, becoming a professor in Yale Law School, of which he was made dean in January, 1904. He has written several books, among which is *Expert Testimony*, and he has also contributed to the magazines.

Rogers, JOHN (1829–1904), an American sculptor, born in Salem, Mass. He was educated at Rome and Paris, but returned to the United States, where he first gained prominence by his sculpture *The Slave Auction*. During the Civil War he executed several small groups of war subjects, which became very popular. Afterward he produced numerous statuettes in green clay, which brought him wide fame, though they did not raise his standing as an artist. Of his larger works, perhaps the best-known is the equestrian statue of General Reynolds in Philadelphia.

Rogers, RANDOLPH (1825–1892), a famous American sculptor, born at Waterloo, New York. He engaged in business in New York and Ann Arbor, Michigan, and in 1846 he went to Rome, where he studied for four years with Bartolini and other sculptors. Upon his return he acquired a great reputation by his statues of *Nydia, the Blind Girl of Pompeii* and the *Boy and a Dog.* From 1855 until his death he lived in Italy. He designed and modeled the bronze doors of the addition to the Capitol, built in 1855, and he made the figures of Marshall, Mason and Nelson for the Richmond, Va., Washington Monument. His most celebrated works are the colossal memorial monuments erected at Providence, R. I., Detroit, Mich., and Worcester, Mass. He also made the statue of the *Genius of Connecticut* for Hartford and the great statue of Lincoln in Philadelphia.

Rogers, SAMUEL (1763–1855), an English poet. After completing his attendance at school, he entered a banking establishment as a clerk, but his favorite pursuits were poetry and literature. His first appearance before the public was in 1786, when he gave to the world his *Ode to Superstition, and Other Poems. The Pleasures of Memory,* with which his name is principally identified, appeared in 1792. He also published *The Voyage of Columbus,* a fragment; *Jacqueline,* a tale; *Human Life,* and *Italy,* a descriptive poem in blank verse.

Rohlfs, *rolfs,* ANNA KATHARINE GREEN (1846–), an American novelist, born in Brooklyn, N. Y. She was graduated from Ripley College and was married to Charles Rohlfs, but has been best known by her maiden name. She won her first great success with *The Leavenworth Case,* which was an ingenious detective story. A large number of detective stories followed this one, but they are all in a measure patterned after the first.

Rohlfs, GERHARD (1831–1896), a celebrated German traveler. He studied medicine, and from 1855 to 1860 he served with the French in Algiers, as surgeon in the foreign legion. In 1860 he traveled through Morocco and explored the Tafilet oasis. In 1863, and again in 1865, he traveled in North Africa. He joined the English Abyssinian expedition in 1868, and in the years following he traveled in Cyrenaica and through the Libyan desert. In 1878 he undertook a new journey to Africa and penetrated to the Kufra oasis. He was appointed German consul-general at Zanzibar in 1884. His works include, among others, *Journey through Morocco, Land and People of Africa, Across Africa, Journey from Tripoli to the Kufra Oasis* and *My Mission to Abyssinia.*

Ro′jestven′sky, SINOVI PETROVICH (1848–), a Russian naval commander. He served in the Russo-Turkish War, was naval attaché to the Russian embassy in London and took part, as second in command to Admiral Alexieff, in the Chino-Japanese War. In 1902 he was made rear admiral, and two years later he was placed in command of the Baltic fleet. On May 27, 1905, while on his way to Vladivostok, he encountered Togo, with the Japanese fleet, and the struggle which began at once was the great Battle of the Sea of Japan. Rojestvensky's flagship and seventeen other Russian war vessels were sunk, and seven vessels and over 4000 prisoners were captured. See RUSSO-JAPANESE WAR.

Ro′land or **Orlando,** a celebrated hero of the romances of chivalry, one of the paladins of Charlemagne, of whom he is represented as the nephew. His character is that of a brave, unsuspicious and loyal warrior, somewhat simple in his disposition. According to the *Song of Roland,* an old French epic, he was killed at the Battle of Roncesvalles, after a desperate struggle with the Saracens, who had attacked Charlemagne's rear guard. The celebrated Romantic epics of Boiardo (*Orlando Innamorato*) and Ariosto (*Orlando Furioso*) relate to Roland and his exploits.

Roland de la Platière, *ro lahN′ de la platyair′,* MARIE or MANON JEANNE PHILIPON, Madame (1754–1793), a Frenchwoman who was very prominent during the early part of the French Revolution. She was precocious from childhood and delighted especially in philosophical and ethical works. She married, in 1780, Jean Marie Roland de la Platière. Shortly after the outbreak of the Revolution, her home became the meeting place for the Girondist leaders, and she was active in support of the Girondists, even after they lost their influence. In June, 1793, she was thrown into prison, and in November of the same year she was executed. During her imprisonment she wrote memoirs, which constitute a very valuable history of the times.

Rolfe, JOHN, one of the early English colonists in America. He arrived in Virginia in

1610 and is celebrated in its history for two reasons: He is said to have been the first white man to cultivate tobacco, and he married the famous indian princess Pocahontas. He took her with him to England in 1616, but returned to the colony after her death and became prominent in its affairs. See POCAHONTAS.

Rolling Mill, a mill for reducing iron and steel ingots to bars, rods, plates and other shapes. The mill consists of one or more pairs of iron rollers, mounted on a frame and so arranged that the space between them can be adjusted by screws. In most mills the rolls are geared to each other by heavy cog wheels, and each set of rolls is operated by its own engine, which is reversible, so that the mill can be run either way. Each machine contains devices for feeding and guiding the iron as it passes through the rolls. Each mill, or set of rolls, is constructed to do a special kind of work and cannot do any other. For instance, mills designed for rolling plate have smooth rollers, so adjusted that as the metal passes between different sets it is successively reduced to thinner sheets, until the required thickness is obtained. Mills designed for making rods have the rollers grooved so as to produce a rod of the desired shape, while those for the manufacture of railway rails have their rolls grooved so as to produce these rails ready for use.

The rolling mill is most extensively used in manufacturing steel into structural shapes. The steel comes to the mill in blooms, which are heated white hot, is then taken to the rollers, the first set of which is known as the roughing mill. After passing through this mill the steel goes to the intermediate rolls, and from these to the finishing rolls, where it is reduced to the desired form and size. See STEEL.

Roman Architecture. See ARCHITECTURE.

Roman Art. See PAINTING, subhead *Ancient Period*; SCULPTURE, subhead *Italy*.

Roman Catholic Church, that body of Christians which accepts the pope as its visible head. Roman Catholics believe that the Church was established by Jesus Christ and committed to Saint Peter as the chief of the Apostles, to whom he gave the keys of the Kingdom of Heaven. They believe it to be the only Church of Christ, beyond whose pale there is no salvation. The word *pale*, however, according to Roman theology, includes those of other Christian churches who understand and live in accordance with the precepts and teachings of Christ. The power bestowed by Christ upon Saint Peter is believed by Catholics to descend to his successors to the end of time and is vested in the pope as high pontiff of the Church. The creed, or belief, of Catholics is defined in the Apostles' Creed, the Nicene, the Athanasian and, most minutely, in that of Pius IV, after the proclamation of the Council of Trent in 1562. The Church has seven sacraments, which are believed to impart spiritual grace, three of which can be taken advantage of but once, namely, baptism, confirmation and holy orders. The ceremonial of the mass is regarded as the most sacred and solemn in the ritual of the Church. In it Catholics believe that the body, blood, soul and divinity of Jesus Christ are really present in the bread and wine, and that this form of worship was ordained by Christ at his Last Supper with his Apostles and has continued to the present time.

Catholics believe that Mary, the mother of Christ, can obtain for them innumerable spiritual benefits, if they appeal to her. They believe that in her conception she was immaculate. Notwithstanding the fact that divine worship is denied to her, she is honored beyond any of the other saints. Her invocation and that of the other saints is prescribed in the Creed of Pius IV, which also imposes reverence for images of them, such as statues or pictures. After the Virgin Mary, Saint Joseph is the most honored of all the saints.

A place of purification after death, known as purgatory, is also believed in by members of the Roman Church. Those dying penitent, but not wholly cleansed from sin, make full atonement in purgatory, after which they are admitted into heaven.

The definition of the Church, as understood by Catholics, is a congregation of all the faithful under the supremacy of the pope, who has been pronounced infallible. His infallibility, however, is limited to questions of doctrine and faith, which have been or would be defined by councils of the Church, composed of cardinals and other ecclesiastical hierarchs.

All entering the priesthood must assume the vow of celibacy before admission to holy orders, according to the law of the Western Church. There is, however, no apostolic obligation on the Church to impose celibacy as an indispensable qualification for the priesthood, but it is regarded as an important quality, since those in a married state would not give their attention wholly to spiritual duties. Gregory the Great and the Council of Toledo in 653 prohibited marriage by those in holy orders. Persons in minor orders, though married, were for centuries allowed to serve the Church. In the twelfth century minor priests at marriage were deprived of clerical privileges. Boniface VIII, in 1300, permitted them to act as clerks, provided they had the sanction of the bishop. The Council of Trent subsequently pronounced such marriages null and void. In the East clerical celibacy existed in Thessaly, Achaia and Macedonia in the fifth century. When Synesius in 410 was elected bishop of Rome, he accepted the office only on the condition that he be allowed to live with his wife. The consequences of various laws on the question are that Greeks who aspire to the priesthood leave the seminaries and return for ordination after marriage; that secular priests can live in the married state, but on the death of a wife cannot take a second, and that bishops are chosen from the monks. All monks and nuns must be celibates.

Romance, *ro mans'*, a fictitious narrative in prose or verse, the interest of which turns upon either marvelous or uncommon incidents. The name is derived from the class of languages in which such narratives in modern times were first widely known and circulated—the French, Italian and Spanish, called the *Romance Languages*. The earlier medieval romances of Western Europe were metrical and may be divided into two classes—the popular epics, chanted by strolling minstrels, and the more elaborate and artificial poems, composed and sung by the court poets. Both classes were based on more ancient lays, treating of celebrated heroes, frequently mingled with pagan myths and with connecting passages composed by the reciters. Thus originated a series of epics, grouped around some renowned hero and forming a cycle of romance. The romances of French origin form a large and interesting body of literature. Some of them reach a length greater than 20,000 lines. These romances were sung by wandering minstrels, to the sound of a kind of violin. Many of the reciters wrote their own chansons, while others bought copies from the original composers. The romances of the Arthurian cycle owe their origin to the lays of the Welsh bards, supposed to be as old as the sixth and seventh centuries, but they are directly based on the Latin *History* of Geoffrey of Monmouth, which was versified in French by Wace (1155–1158) and was amplified and translated into English by Layamon, about 1204. The Arthurian romance spread from France to Provence, Spain, Italy and the Netherlands, and was again transplanted into England. It is through Malory's *Morte D'Arthur* (1485), a prose version of the tales, that it came down to later times.

The favorite heroes of romance, besides Arthur, were Charlemagne, Roland, Alexander, Richard Lion-Heart and Guy of Warwick; but in addition to romances dealing with these, we find, also, a class in which exploits of Teutonic heroes are celebrated, as the Anglo-Saxon or Anglo-Danish *Beowulf*, the old German *Nibelungenlied* and the romance of *Havelok the Dane*. The poetical romance was superseded by the prose romance, the transformation of metrical into prose romances being due in part to the invention of the art of printing, by which the necessity of meter for purposes of recital was done away with. The prose narratives, which, like those in verse, celebrated Arthur, Charlemagne, Amadis de Gaul and other heroes of chivalry, had a definite part in the development of the novel. See NOVEL.

Romance Languages, those languages of southern Europe which owe their origin to the Latin language and to the spread of Roman dominion and civilization. They include Italian, French, Provençal, Spanish, Portuguese, Rumanian and Romansh. Their basis was not, however, the classic Latin of literature, but the popular Roman language, spoken by the Roman soldiers, colonists and others and variously modified by uneducated speakers of the different peoples, among whom it became the general means of communication. In all of these tongues Latin is the chief ingredient, and a knowledge of Latin helps very greatly in mastering them.

Romanesque, *ro man esk'*, **Architecture.** See ARCHITECTURE.

Roman Law. See CIVIL LAW.

Roman Literature. See LITERATURE, subhead *Latin Literature.*

Romans, EPISTLE TO THE, the most elaborate and, from a doctrinal point of view, the most important, composition of Saint Paul. It sets forth that the gospel doctrine of justification by faith is a power unto salvation to all men, both Jews and Gentiles. The writer then deplores the rejection of the Jews, admonishes the Romans to exercise the various gifts bestowed upon each in a spirit of love and humility, especially urges the strong to bear with the weak and concludes with various salutations and directions

Romanticism, *ro man'te siz'm*, a term used in opposition to *classicism*, to denote the protest against the influence of Greek and Roman literature on the literature of western Europe. It is also used as the opposite of realism. In

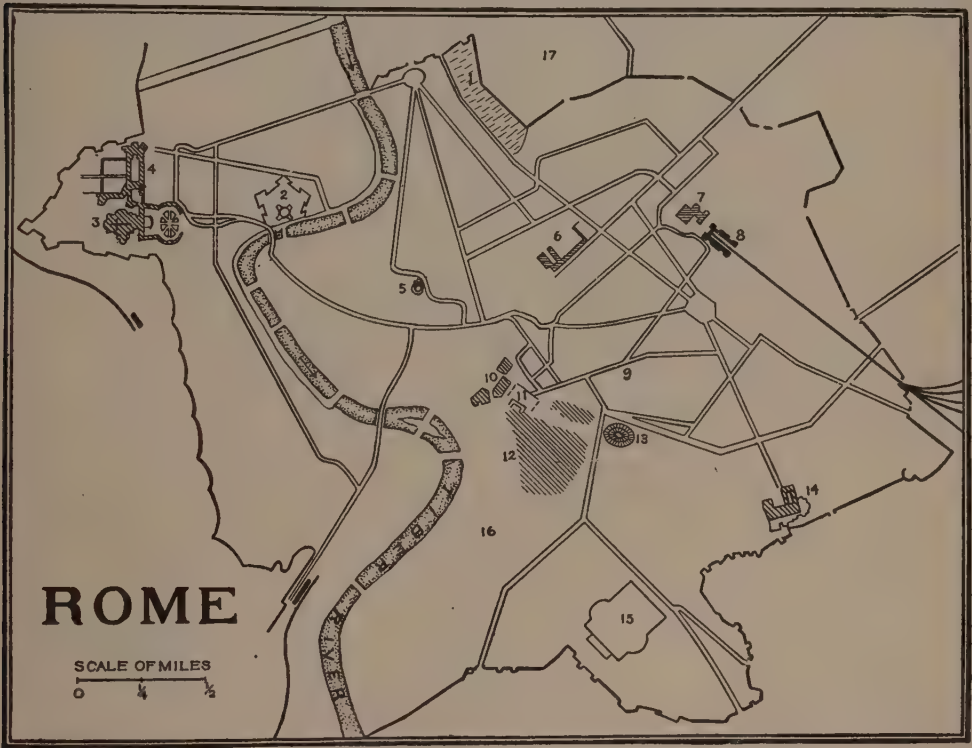
England the movement became prominent during the second quarter of the eighteenth century; its first note was struck by Thomson, in his *Seasons*, poems which differed widely in spirit and in form from the unimaginative intellectuality of the work of the early years of the century, when Pope's influence was dominant. Gray, Goldsmith and Cowper continued in their poems the protest against the belief that artificial rhetoric and correctness of form constitute true poetry; and the movement reached its height in Scott, Byron, Shelley, Keats, Wordsworth, Coleridge and Burns. In Germany the leaders in the opposition to classic ideals in literature were Lessing and Herder; Goethe's *Sorrows of Werther* is one of the extreme products of the movement. But the name *Romantic School* is usually given in Germany to the group of which the chief members were the brothers Schlegel, Novalis, Tieck, Schelling and Schleiermacher. Victor Hugo, by the publication of his *Odes and Ballads*, in 1826, and of his *Cromwell*, shortly afterward, became the leader of the romantic movement in France.

Roman Walls, certain walls or ramparts, constructed in Britain by the Romans. The most celebrated of these is the wall built by Hadrian (120 A. D.) between the Tyne and the Solway. It was further strengthened by Severus and is often called the Wall of Severus. In 139 a second wall, or northern rampart, was built between the Forth and the Clyde, known as the Wall of Antoninus. These walls formed the northern boundaries of the Roman dominions in Britain, and were built to prevent the incursions of the Picts and Scots.

Rome, the capital city of the Roman republic, kingdom and empire; the religious center of Western Christendom, and now the capital of United Italy. It is located on the hills on both sides of the Tiber River, about 15 miles from the sea.

ANCIENT ROME. During the many hundred years of Rome's existence its appearance and condition changed repeatedly, but it is best known as it appeared during the reign of the emperor Augustus, when it was at the height of its splendor. The streets were crooked and narrow, and most parts of the city squalid and loathsome, but splendid public buildings, such as temples, porticoes, theaters and baths gave parts of it an appearance of wonderful beauty. At that time the population is supposed to have been more than a million, and in the time of Trajan it was not far short of two million. It was surrounded by high walls, the Tiber was spanned by eight or nine bridges, and within the walls were open places, or parks, covered with grass and trees. Several paved spaces, surrounded by elegant buildings, were the places of public meeting, and of such the *Forum Romanorum*, which lay between the Capitoline and Palatine hills, was chief, although the Forum of Trajan was more splendid. The great and central street of the city was the *Via Sacra*, or Sacred Way, which, beginning at the base of the Capitoline Hill, ran along the Forum by the Colosseum and to the space between the Esquiline and Caelian hills. The two principal roads leading out of Rome were the Flaminian Way, or Great North Road, and the Appian Way, or Great South Road. The oldest and most sacred temple was that of Jupiter Capitolinus, on the Capitoline Hill. The Pantheon, a temple of various gods, is a great circular building with a dome roof, 140 feet wide and 140 feet high. It was a marvel of construction, and so well was the work done that the Pantheon is still in excellent preservation. Other temples built at various times were the white marble Temple of Apollo, on the Palatine; the Temple of Minerva, which Pompey built and which Augustus covered with bronze; the Temple of Peace, once the richest and most beautiful in Rome; the Temple of the Sun, and the magnificent Temple of Venus, which Caesar caused to be built to her. The principal imperial palaces were on the Palatine Hill. The most magnificent of the amphitheaters was that of Titus, completed in 80 A. D., and now known as the Coliseum or Colosseum (See COLOSSEUM). The Circus Maximus, between the Palatine and the Aventine, and the theaters of Pompey and Marcellus, were all celebrated for their size and elegance. The public baths of Rome were numerous, and some of them were enormous buildings, splendidly decorated and furnished. Extensive ruins of the baths of Caracalla and of Diocletian still remain and testify to the luxury with which the pleasure-loving Romans surrounded themselves.

Rome was decorated with triumphal arches and beautiful columns, built at various times. In the corner of the Forum may still be seen the great Arch of Septimius Severus; at the other end is the beautiful Arch of Titus, and nearer the Colosseum is the well-preserved Arch of Constantine. Trajan's beautiful pillar, 117 feet high, still stands among the ruins of his Forum. A spiral panel, running from top to bottom, shows in relief the triumphs of Trajan, and furnishes to modern scholars the best illustrations of the costumes and habits of the epoch. Within, a flight of stairs gives access to the top of the pillar. Magnificent tombs were located here and there throughout the city, chief among which were the Mausoleum of Augustus and the noble tomb of Hadrian, still standing on the west bank of the river and known as the Castle of Saint Angelo. Only passing mention can be made of the rich private dwellings of the nobility, crowded with treasures of art, which ornamented the more favored parts of the city.



1, Pincian Hill; 2, Hadrian's Tomb; 3, Saint Peter's; 4, Vatican; 5, Pantheon; 6, Quirinal (Royal Palace); 7, Baths of Diocletian; 8, Railway Terminal; 9, Column of Trajan; 10, Capitol; 11, Forum; 12, Palatine Hill; 13, Colosseum; 14, Lateran; 15, Baths of Caracalla; 16, Aventine; 17, Villa Borghese.

Modern Rome. Since Rome became the capital of modern Italy it has been improved in cleanliness and general healthfulness; it has been given excellent systems of electric railways, wide new streets and whole sections of fine modern buildings, so that it is an attractive city, aside from its historical associations. The city is surrounded by a wall and is entered by twelve gates and several openings through which railways pass. The wall on the east bank occupies the lines laid down by Aurelian in the third century, but the west wall was not built until the seventeenth century. There are ten fine bridges across the Tiber within the city, and great stone embankments keep the treacherous stream within its banks and prevent the lower parts of the city from being flooded, as they were in former times.

Among the principal squares of modern Rome is the Piazza del Popolo, on the north side of the city, near the Tiber, from which the three principal streets of the city diverge. Another street crossing the river leads to the Vatican and the Church of Saint Peter's, which occupy conspicuous positions on the hills. The Quirinal, or the king's palace, is situated on an eminence near the center of the city. The Capitoline Hill is still crowned by the Capitol and two large museums on the sides of a little central court, in which is the equestrian statue of Marcus Aurelius. The appearance of the hill, however, has been much changed of late by the erection of a great monument to Victor Emmanuel. The Palatine Hill is a mass of ruins which, with the territory immediately surrounding it, is still the subject of continued excavations, which are from time to time revealing remarkable remains of ancient Roman splendor. The Forum has been excavated and contains many fragments that show the beauty of its statuary and other decorations. Rome is filled with beautiful churches, of which the greatest are the Church of Saint Peter's and the Cathedral of Saint John in Lateran, the latter in an isolated locality near the south wall of the city. There are beautiful parks and fine drives through the city, especially on the Janiculum, a hill extending along the west bank of the river. The Pincian Hill, near the Piazza del Popolo, is laid out with gardens and beautiful drives, and is a favorite afternoon resort.

Outside the walls near by are the Borghese gardens and the palace, celebrated for its picture gallery. Other private palaces within the city contain fine collections of paintings, most of which have been secured now by the Italian government. Public museums and picture galleries are numerous, and in them are guarded the treasures of art from early times to the present. Among them the Vatican may be considered the greatest, with its unrivaled collections of statuary and paintings, but the Capitoline Museum contains some of the most famous statuary of the world. Educational institutions abound, among which the University of Rome ranks first. The *Collegio Romano*, formerly a Jesuit college; the *Collegio de Propaganda Fide*, an establishment where Roman Catholic missionaries are trained; the American School of Classic Languages, and several other institutions for training in art, science and literature register numerous students. There are several great libraries, modern theaters, hospitals and other public and charitable institutions, such as are found in most cities, though all are more or less affected by the historic importance of the city and the fact that it is the center of interest for travelers the world over. This affects also the trade of the city, which is externally unimportant, as the river can be navigated only by small craft, while railway facilities are limited. However, woolen and silk goods, artificial flowers, jewelry, earthenware and objects of art are manufactured, and trade in these is considerable.

From the downfall of the Roman Empire, the history of Rome is included in that of the papacy. In 1527 the city was captured and sacked by the troops of the Constable of Bourbon; in 1798 it was occupied by the French; in 1848 Pius IX was driven from Rome and a Roman republic was formed, under Mazzini and Garibaldi. A French army sent to the pope's assistance captured Rome in July, 1849, and under the protection of the French, the pope ruled until October, 1870, when Rome was occupied by the Italian troops. In June, 1871, the "Eternal City" became the capital of United Italy, and the king took up his residence in the Quirinal. Population, about 500,000.

Rome, History of. The origin of Rome is connected in legend with the Trojan War, through Aeneas, who was led by the will of the gods to Italy. His son Ascanius founded Alba Longa, which placed itself at the head of the league of Latin cities, and some four hundred years after the founding of the city, Romulus and Remus, the grandsons of Numitor, king of Alba Longa, founded a new city on the Palatine, one of the seven hills on the left bank of the Tiber (753 B. C.). In a quarrel over the name and government of the city, Remus was slain by his brother, who became the first king of Rome. To hasten the growth of his new city, Romulus made it a place of refuge, to which he invited the lawless and discontented from the surrounding country. As neighboring tribes refused to allow their women to marry the Romans, Romulus secured wives for them by the so-called *rape of the Sabines*. The war with the Sabines, to which this led, was ended by the intercession of the women, and the Romans and Sabines united in a single nation.

In prehistoric Italy there were numerous tribes, the most important of which were the Latins. Rome subdued the less important cities of Latium one after another, and the inhabitants moved to Rome, where they formed the plebeian class, which was without political rights. At the head of the government of Rome was the king, who was elected by the people, and next to him was the Senate, composed of three hundred members. A popular assembly, which included the heads of all the families, had the right to make laws, decide upon peace and war and confirm the election of the king. Tradition gives as the names of the kings of Rome who succeeded Romulus, Numa Pompilius, Tullus Hostilius, Ancus Martius, Tarquinius Priscus, Servius Tullius and Tarquinius Superbus, the last of whom reigned until 509 B. C. The period of the kings was occupied largely with contests between the patricians and plebeians, as a result of which the latter gained certain privileges. The

SAINT PETER'S, ROME

last king, Tarquinius Superbus, by his acts of oppression so angered the people that they rose against him and drove him from the state, declaring that henceforth the supreme power should be held by no one for life. Rome was declared a republic, and at the head of the new government were placed two magistrates, called consuls, chosen for one year and possessing powers which were almost identical with those of the early kings.

The first two or three hundred years of the Republic were marked by bitter contests between the patricians and plebeians (See PLEBEIANS). The first step toward equality and protection for the plebeians against the patricians was the creation in 494 of the office of tribune, which the plebeians secured by withdrawing from the city and refusing to return until concessions were granted. Another demand which the plebeians made was that the laws, which hitherto had not been written down, should be codified and put in such a form that any one might acquaint himself with them. The result of this was the appointment of the decemvirs and the preparation of the Law of the Twelve Tables, upon which all subsequent Roman jurisprudence was based. A law legalizing intermarriage between the plebeians and patricians equalized the two orders socially, and the demand of the lower class for admission to the consulship resulted in a compromise—the election of military tribunes, with consular power, who might be from either order. Of the quaestors, who were first elected in 447, it was provided that two might be plebeians, and in 367 the *Licinian Law* not only admitted plebeians to the consulship, but declared that one of the consuls must be a plebeian. To offset this advantage, the patricians secured the new office of praetor, but the praetorship also was soon opened to the plebeians. Externally this period was marked by numerous wars. The neighboring tribes, which had made treaties with the king of Rome, regarded their allegiance as ended by his expulsion, and certain Etruscan tribes, with Lars Porsenna of Clusium at their head, aided Tarquin in his vain attempts to recover his throne. Chief of the wars in which Rome engaged against the neighboring tribes were those against the Veientines, the Volscians and the Aequians. In 390 B. C. the Gauls under Brennus invaded Roman territory from northern Italy, captured Rome, which they plundered and burned, but failed to take the citadel, which was heroically defended by Manlius for seven months. See DRESS, *color plate*, Figs. 5 and 6.

In her progress southward, Rome came into collision with the Samnites, and a contest for the mastery of Italy began which lasted for over fifty years (343–290), with occasional interruptions. In spite of some defeats, the Romans were ultimately successful, and firmly established their supremacy over the Samnites. Rome's progress in the East was opposed by the Tarentines, who called to their aid Pyrrhus, king of Epirus. Pyrrhus was in the end defeated and compelled to leave Italy, and the supremacy of Rome in southern Italy was secured.

Rome next came into collision with Carthage, the most powerful foe she had thus far encountered. The two peoples had had a treaty of alliance since 348, but it was of little significance, and the jealousy with which each viewed the progress of the other grew, until in 264 B. C., on a slight pretext, war was declared (See PUNIC WARS). Between the close of the first Punic War (241) and the outbreak of the second (218), both Rome and Carthage were busy strengthening their resources. The final result, however, was the same as that of the first war, and Carthage was completely defeated (See REGULUS, MARCUS ATTILIUS; HAMILCAR BARCA; HANNIBAL; SCIPIO, PUBLIUS CORNELIUS). Carthage lost to Rome all her colonies and was obliged to pay a large annual tribute. Rome's next wars of conquest were in the East. The first Macedonian War (214–205) accomplished little, as Rome was at the time engaged in the struggle with Carthage, but the second ended with the complete defeat at Cynoscephalae, in 197 B. C., of Philip V of Macedon. In 172 the Greeks united under Perseus, the new king of Macedonia, and the third Macedonian War followed, which was ended by the decisive victory of the Romans at Pydna (168). Twenty years later the Achaean League attempted a revolt, and Roman armies promptly marched into Greece, put down the rising and converted Greece into a Roman province (146 B. C.). This same year marks the close of the third Punic War (149–146), which consisted merely in the siege and heroic defense of Carthage. The splendid city was destroyed, and Africa became a Roman province. In Spain an obstinate war had been carried on by the Celtiberians, but the country was finally subdued in 133.

The last century of the Roman Republic was marked by incessant civil dissensions. In spite of the nominal equality in the civil and political rights of the two orders, the government was exclusively in the hands of the nobility, and the

Senate ruled with almost sovereign power. Attempts were made to better the condition of the plebeians (See Agrarian Laws; Gracchus), but they accomplished little. From the death of the younger Gracchus, in 121, a corrupt aristocratic government ruled. The honor of the Roman state had sunk so low that when Jugurtha, king of Numidia, revolted and usurped the neighboring territory, which was under the Roman protectorate, the commissioners sent to investigate and the army dispatched to subdue him were readily won over to his side by bribes. At length, however, the war against Jugurtha was taken up and brought to a successful close by Caius Marius (106).

Rome was now threatened from the north by two Germanic nations, the Cimbri and the Teutones, and this danger also Marius averted. In 91 B. C. began a fierce struggle known as the Social War, in which the Latins and the various Italian peoples contended for the rights of Roman citizenship, which belonged only to the inhabitants of the capital and of Roman colonies. Although generally victorious, Rome wisely ended the strife by granting the privileges demanded. In this Social War, Marius and Sulla fought side by side, but jealousy between them was constantly growing, and when, in 88, Sulla was chosen as a leader in the war against Mithridates, king of Pontus, the result was the civil war (See Marius, Caius; Sulla, Lucius Cornelius). The war with Mithridates was a long and stubborn contest, but it was finally brought to a close in 65 B. C. by the defeat of Mithridates by Pompey. The Catiline conspiracy, which broke out in Rome in 63 B. C., was put down only by the vigilance and genius of Cicero (See Cicero, Marcus Tullius; Catiline).

For the next twenty years, the history of Rome is the biography of the men who in 60 B. C. formed the famous first triumvirate—Caesar, Pompey and Crassus (See Caesar, Caius Julius; Pompey; Crassus, Marcus Licinius). After the death of Caesar, his assassins did not receive the public approval which they had expected, and the chief power of the state fell into the hands of Mark Antony. After several years of struggle, a second triumvirate was formed, consisting of Octavius, Antony and Lepidus. (For the history of Rome down to the formation of the Empire, see Augustus, Caius Julius Caesar Octavianus; Lepidus, Marcus Aemilius; Antony, Mark; Cleopatra.) When his rivals were removed, Octavius was able to establish under republican forms an absolute and perfect monarchy. In 29 B. C. he received the supreme power for life.

During the first two hundred years of the Empire, the forms of constitutional government were generally observed. The oppression of occasional tyrants, as Tiberius and Nero, affected chiefly the capital, the provinces being usually unmolested and well governed. Tiberius (14–37) first ruled with wisdom and moderation, but afterward became suspicious, cruel and tyrannical (See Tiberius). During this reign occurred the preaching and crucifixion of Jesus Christ. Tiberius was followed by three other emperors of the Claudian house, Caligula (37–41), Claudius (41–54) and Nero (54–68). One of the most important events during this period was the conquest of Britain, during the reign of Claudius. Under Nero occurred the burning of Rome, which was followed by a cruel persecution of the Christians.

After the three short reigns (68–69) of Galba, Otho and Vitellius, the favorite commander Vespasian (69–79) was chosen emperor. His reign and that of his son Titus (79–81) were notably prosperous and free from tyranny. It was during the reign of Titus that the eruption of Vesuvius occurred, by which Pompeii and Herculaneum were destroyed (See Pompeii; Herculaneum). Diocletian (81–96), the last of the twelve Caesars, was followed by the "five good emperors," Nerva, Trajan, Hadrian, Antoninus Pius and Marcus Aurelius, whose reigns were happy and prosperous. Under Trajan, the Roman Empire extended its boundaries to the farthest limits attained in its history (See Trajan). Hadrian, realizing that the Empire was in danger if its boundaries were extended too far, relinquished the conquests which Trajan had made beyond the Danube and beyond the Euphrates (See Hadrian). Under Marcus Aurelius occurred the conflict with the Marcomanni, which marked the beginning of the long and desperate struggle of Rome with the German tribes.

With the reign of Commodus (180–192) began the decline of the Roman Empire. This was at first gradual, but incompetent rulers and invincible hordes of barbarians hastened the inevitable fall. Under Septimius Severus (193–211) occurred a change in the attitude of the imperial government toward Christianity, and under his protection this religion began to make rapid progress throughout Roman dominions. Alexander Severus (222–235) gave Rome an able government and sought to check the military supremacy and corrupt tendencies of the time.

The period of anarchy (251–268), during which various claimants to the imperial dignity were constantly warring among themselves, seemed about to cause the dissolution of the Empire, but it was saved for a time by the succession of five good emperors, Claudius, Aurelian, Tacitus, Probus and Carus. Of these the most famous is Aurelian (270–275). With the reign of Diocletian (284–305), the last trace of republicanism vanished, and Rome became an absolute monarchy. This saved the Empire for nearly two hundred years more, although the appointment of Maximian to the post of joint emperor began the division of government administration which finally resulted in the separation of East and West. Diocletian is remembered for his terrible persecution of the Christians. This was the last pagan persecution of the Church, for under Constantine the Great (sole emperor, 323–337), Christianity became the state religion. In 330 the capital of the Empire was moved to Byzantium, afterward Constantinople. The division of the Empire among Constantine's sons led to a struggle which lasted till 350, when Constantius became sole emperor. He was succeeded by Julian the Apostate (361–363), so called because of his efforts to restore paganism.

In the reigns of the joint emperors, Valentinian and Valens, the barbarian tribes on the north again became threatening, while in Africa the Moors, and in Britain the Scots and Picts, almost destroyed the Roman supremacy. In 376, after the death of Valentinian, the Visigoths, fleeing from the Huns, were allowed by Valens, who still ruled in the East, to cross the Danube and settle as allies. The agents of the government exasperated them by unfair dealing, and the result was a battle, in which the Romans were defeated (378); but under Theodosius the Great (379–395) the Romans succeeded in subduing the Goths.

At the death of Theodosius, the Empire was divided between his sons, Arcadius and Honorius, the latter receiving the West, the former becoming ruler of the Byzantine Empire (See BYZANTINE EMPIRE). Between the East and West, jealousy arose, and one power often saved itself from the barbarians by inducing them to turn their hordes against the other. The Goths under Alaric were defeated by Stilicho, the general of Honorius, first in Greece and later in Italy, but after the death of Stilicho they returned and captured and sacked Rome. Meanwhile, in the provinces, the Roman rule had ended with the withdrawal of the legions to defend Italy. The Visigoths founded a kingdom in southern France and Spain, and the Vandals took possession of northern Africa. When the Huns, under Attila, appeared, and after exacting tribute from the Eastern emperor, descended upon Gaul, the united Roman and Gothic armies opposed them at Châlons and defeated them (451). The following year, Attila marched into Italy and threatened Rome, but was induced by the pleas of Leo the Great, the Christian bishop, to spare the city. In 455 the Vandals under Genseric captured the city and plundered it for two weeks. Between 456 and 472 Count Ricimer created and deposed emperors at will.

The last of the Roman emperors, strangely enough, bore the name of Romulus, surnamed Augustulus. In 476 Odoacer dethroned this child emperor and took the title of king of Italy (See ODOACER); he thus brought the Roman Empire in the West to an end. Rome now became a province of the Byzantine empire and was ruled in theory, sometimes in fact, from Constantinople, until, in 800, the crown of the Western Empire was placed on the head of Charlemagne (See CHARLEMAGNE).

Besides the cross references given above, see articles on other important persons mentioned.

Consult F. Marion Crawford's *Ave Roma Immortalis*, Samuel Dill's *Roman Society from Nero to Marcus Aurelius* and Isabel Lovell's *Stories in Stone from the Roman Forum*.

Rome, GA., the county-seat of Floyd co., 72 mi. n. w. of Atlanta, on the Oostanaula and Etowah Rivers, where they unite to form the Coosta, and on the Central of Georgia, the Nashville, Chattanooga & Saint Louis and several lines of the Southern railroad. It is one of the growing industrial cities of the new South, and it contains cotton, planing and hosiery mills, machine shops, an iron furnace, a furniture factory and various other establishments. There is also a large trade in cotton, grain, hay and fruit. The city has a good post-office building, a county courthouse, sixteen churches, Mobley Park and nine steel bridges across the rivers. It is the seat of Shorter College for women, and it also has the Hearn Institute and the Everett Springs Seminary. The place was chartered as a city in 1847. It was the scene of several engagements during the Civil War. Population in 1900, 7291; estimated in 1905, 15,000.

Rome, N. Y., a city in Oneida co., 15 mi. n. w. of Utica, at the junction of the Erie and the

Black River canals, on the Mohawk River and on the New York, Ontario & Western and several lines of the New York Central railroad. It is in a dairying and farming region, producing considerable cheese, butter and hops. There are manufactures of steel rails, locomotives, brass and copper goods, bathtubs and various other articles. The principal institutions include the state custodian asylum for the insane, a state institution for deaf-mutes, Saint Peter's Academy, the Jervis Library, Y. M. C. A. and almost a score of churches. Fort Stanwix was built on the site of the present city in 1758, and near here several battles of the Revolution were fought. Rome was incorporated as a town in 1796 and as a city in 1870. Population in 1905, 16,562.

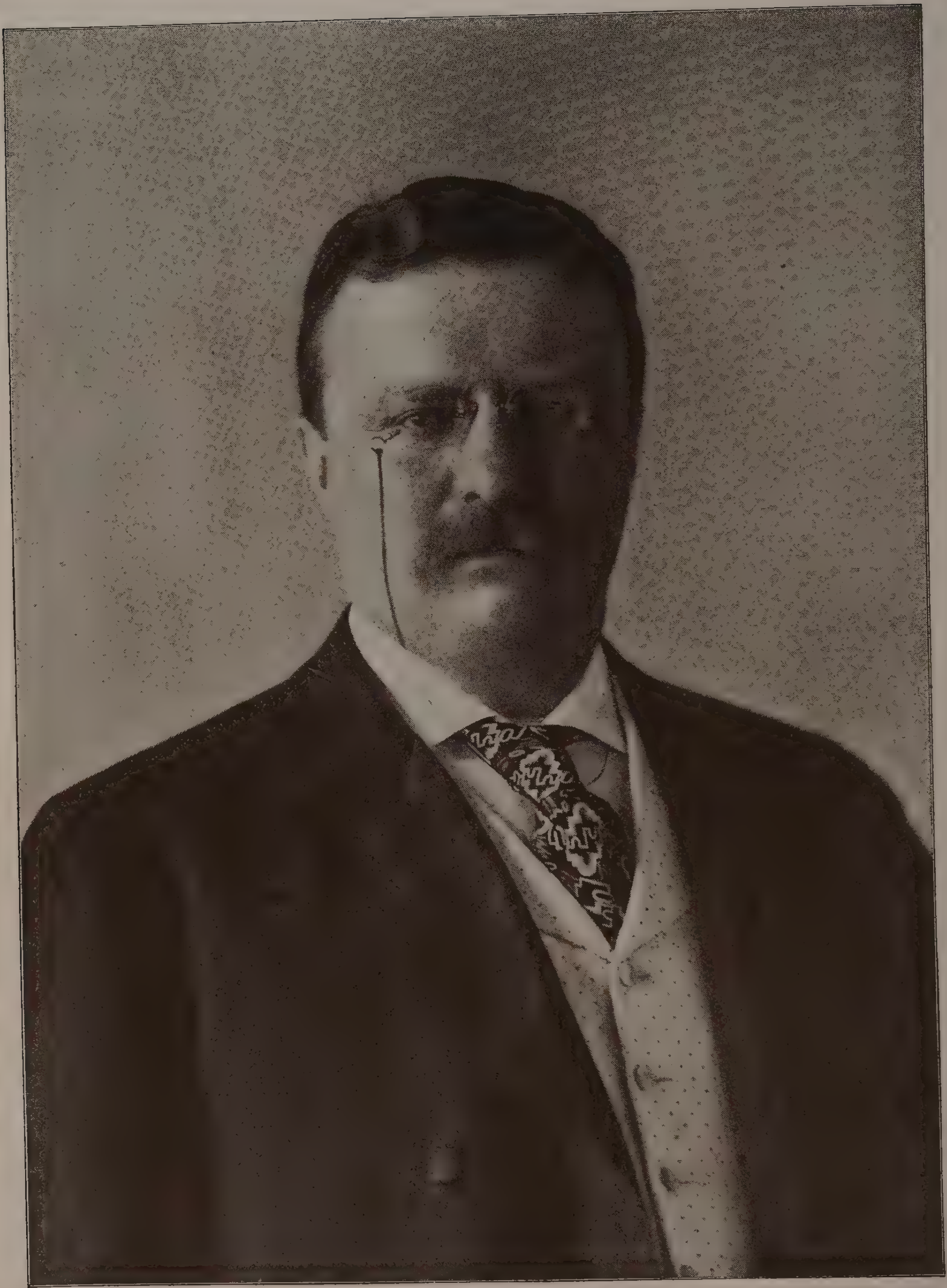
Rom'ney, George (1734–1802), an English painter, born near Dalton, in Lancashire. After a certain amount of local success, he went to London in 1762, and in the next year he won a prize offered by the Society of Art for a historical composition entitled *Death of Wolfe.* He steadily rose in popularity and was finally recognized as inferior only to Reynolds and Gainsborough as a portrait painter; some critics even placed him higher than either. Many distinguished Englishmen and many ladies of rank sat to him for their portraits; but perhaps the most beautiful of his subjects was Emma Hart, afterward Lady Hamilton, whom he depicted in numerous characters. He did not neglect historical or imaginative compositions, and he contributed several pictures to Boydell's famous Shakespeare gallery, founded in 1786.

Rom'ulus, the mythical founder and first king of Rome. His mother was the vestal virgin Silvia, a daughter of Numitor, king of Alba. By the god Mars she became the mother of the twins Romulus and Remus, who were ordered by Amulius, the usurping brother of Numitor, to be set afloat in a basket on the Anio. The basket was stranded beneath a fig tree, at the foot of the Palatine Hill, and the boys were suckled by a she-wolf and fed by a woodpecker, until they were accidentally found by Faustus, the king's herdsman, who took them home and educated them. When they had grown up and become aware of their parentage, they organized a band of enterprising comrades, by whose help they deposed Amulius and reinstated Numitor on his throne. They next resolved to found a city, but as they disagreed as to the best site for it, they resolved to consult the omens. The decision was in favor of Romulus, who immediately began to raise the walls. Remus, who resented his defeat, leaped over the rude rampart in scorn, crying, "Thus will the enemy do," whereupon Romulus slew him, saying, "So perish all who in the future shall cross these walls." Romulus soon attracted a considerable number of men to his new city, by making it a place of refuge for every outlaw or broken man; but women were still wanting. He therefore invited the Sabines, with their wives and daughters, to a religious festival, and in the midst of the festivities he and his followers suddenly attacked the unarmed guests and carried off the women to the new city. This led to a war, which was, however, ended at the entreaties of the Sabine wives, and from that time Romulus and the Sabine king ruled side by side. Romulus is said to have miraculously disappeared in a thunderstorm, carried off, according to the popular belief, by his father, Mars. The date of the founding of Rome was usually given as 753 B. C., and that of the death of Romulus, as 716 B. C.

Roof, the cover of any building. Roofs vary greatly in form and material. Marble and stone were used in the roofs of the buildings of the ancients, while to-day wood, slate, tile and iron are used, shaped into gable, pavilion, ogee, shed, curb, hip and flat roofs. In carpentry, roof signifies the timber framework by which the roofing materials of the building are supported, but in general the term includes the covering and the framework. This framework consists in general of the principal rafters, the purlins and the common rafters. The *principal rafters,* or *principals,* are set across the building about ten or twelve feet apart; the *purlins* lie horizontally upon these and sustain the *common rafters,* which carry the covering of the roof. Sometimes, when the width of the building is not great, common rafters are used alone to support the roof. The *span* of a roof is the width between supports; the *rise* is the height of the center above the level of the supports; the *pitch* is the slope, or angle, at which it is inclined.

Rook, a European bird, of the crow family, which lives upon insects and grain. Rooks nest together in great colonies, or rookeries, where the birds are numbered by the thousands. In habits, the rook partakes of the nature of the crow and the magpie.

Roon, Albrecht Theodor Emil, Count von (1803–1879), a Prussian war minister and field marshal. He entered the army at the age of



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THEODORE ROOSEVELT

eighteen and speedily developed a high talent for the theoretical and educational branches of his profession, was military lecturer at Berlin and published several books on military geography and similar subjects. After serving in succession as captain, major and colonel, he was appointed war minister in 1859 and minister of marine two years later. In 1866 he was made general of infantry and was present with the army in Bohemia during the Seven Weeks' War against Austria. It was chiefly due to his efforts that the North German army was in so perfect a state of readiness and was able to be so rapidly mobilized on the outbreak of war with France in 1870. On the conclusion of the war, Von Roon was made a count, and in 1873 he became field marshal and president of the cabinet.

Roosevelt, *ro'z'velt,* THEODORE (1858–), an American statesman, twenty-sixth president of the United States, born in New York City. He graduated at Harvard University in 1880 and attended Columbia Law School. He early entered politics and was elected to the New York legislature, where, as an independent Democrat, he attracted wide attention, serving for three terms as leader of the Republican minority. He finally allied himself with that party. In 1884 removed to North Dakota, where he became a ranchman. Returning to New York City, he was nominated by the Republican party as candidate for mayor, but was defeated by Abram S. Hewitt, Democrat, who was also opposed by Henry George, the single taxer.

In 1889 Mr. Roosevelt was appointed to the United States civil service commission and was retained in that position by President Cleveland. He resigned in 1895, however, to become president of the police board of New York City, and by his thorough reorganization of the department, in the interests of honesty and efficiency, he won national fame. In 1897 President McKinley appointed him assistant secretary of the navy, and he devoted himself to preparing for the war with Spain, which he believed inevitable. He resigned in April, 1898, and entered the army as lieutenant colonel of the first volunteer cavalry, known as the Rough Riders. He was promoted for gallantry in the Cuban campaign.

Upon his return from the war, he was nominated by the Republican party for governor of New York and was elected. He immediately turned his attention to instituting reforms in the administration of the state business, especially in the management of canals, and he greatly extended the civil service examination system to state offices. By the close of his term, he had become a national leader of the progressive element of the Republican party, and in spite of his repeatedly expressed wishes, he was placed upon the national Republican ticket as a candidate for vice-president. At the death of President McKinley, in September, 1901, Mr. Roosevelt became president.

Retaining President McKinley's cabinet and avowedly continuing his policies, he urged anti-trust legislation and the negotiation of reciprocity treaties. In his foreign policy, however, he took a firm stand in favor of the maintenance of American rights in questions over which other countries were disputing. By his aggressive action in recognizing the newly-formed Republic of Panama, after the rejection of the canal treaty by the senate of Colombia, by his efforts to compel the South American republics to deal fairly with European governments, by his firm stand in favor of the retention and government of the Philippines, he earned the criticism of a large group of conservative statesmen, both of his own and of the opposing parties; but these same episodes, coupled with his aggressive domestic policy, his honesty and sincerity and his executive ability, won for him a host of friends in all classes and parties. Among the events of his administration were the establishment of a permanent census bureau and of the department of commerce and labor, a vast increase in the strength and efficiency of the navy, an important reorganization in the management of the army, the settlement by President Roosevelt, in a personal capacity, of the anthracite coal strike of 1902.

President Roosevelt was unanimously renominated by the Republican convention in 1904 and was opposed by Judge Alton Brooks Parker, the Democratic nominee, and by the candidates of several other smaller parties. After a somewhat listless campaign, he was elected by the largest popular plurality ever recorded for a presidential candidate and by a phenomenal majority in the electoral college. During his second administration he continued his vigorous foreign policy and won an especially striking triumph in his successful efforts to terminate the Russo-Japanese War, the treaty being signed at Portsmouth, N H. Probably the most important event of the period, from a domestic standpoint, was the passage of a radical bill for the regulation of railroad rates by the Interstate Commerce Commission. The period was also characterized by a general reaction in opposition to the unrestricted political and commercial activity of great corporations, which resulted in the investigation by the Federal government of some of the largest trusts engaged in interstate commerce.

Both before and after his election to the presidency, President Roosevelt wrote frequently upon historical and other topics, his most important literary works being *The Naval War of 1812*; *The Life of Thomas H. Benton* and *The Life of Gouverneur Morris*, in the American Statesmen Series; *The Winning of the West*; *The Life of Oliver Cromwell*; *American Political Ideals*; *Essays on Practical Politics*; *The Strenuous Life*; *The Rough Riders*, and numerous works upon western hunting and ranch life, of which perhaps the best are *The Wilderness Hunter* and *Ranch Life and Hunting Trail*.

Root, in arithmetic and algebra, any number or quantity which, by successive multiplications into itself, produces a certain other number. Thus, 2 is a root of 4, because $2 \times 2 = 4$. A number which, used as a factor twice, gives a certain number is called the second, or square, root of the latter number; if used as a factor three times, the third, or cube, root, and so on, with the fourth or biquadrate, fifth, sixth root, etc. The algebraic sign of a root is $\surd$; thus, the fourth root of 16, equal to 2, is written, $\sqrt[4]{16}=2$. The same is the case with algebraic magnitudes, as $\sqrt[2]{(a^2+2ab+b^2)}=a+b$. The process of extracting, or finding, any root of a number is called *evolution.*

Root, Elihu (1845–), an American statesman, lawyer and diplomat, born in Clinton, N. Y., and educated at Hamilton College. He studied law at the University Law School in New York and began practice in 1867. In 1883 he was appointed United States district attorney by President Arthur and served for two years, thereafter returning to private practice. In August, 1899, he succeeded Russell A. Alger as secretary of war and remained in that position until 1904, when he was succeeded by William H. Taft. He took a leading part in the organization of the government in the Philippines and in Porto Rico and also accomplished a beneficial reorganization of the army. In 1903 he was member of the Alaska Boundary Tribunal. President Roosevelt appointed him secretary of state to succeed John Hay in July, 1905.

Root, George Frederick (1820–1895), an American composer, born at Sheffield, Mass. He taught music in Boston and New York, studied a year in Paris and then returned to America. Among his popular songs are *There's Music in the Air*; *The Battle Cry of Freedom*; *Just before the Battle, Mother*, and *Tramp, Tramp, Tramp, the Boys are Marching*. His more pretentious works, including a *Te Deum*, are less known.

Roots, the underground part of a plant, closely allied to the stem, of which they are often the downward projection. Roots serve as absorbing organs and hold the plant in position. They are annual, biennial or perennial in duration of life, and fibrous or fleshy in form. Primary roots spring from the embryo; secondary roots grow later from the shoot. There are different classifications of roots, according to structure. Soil roots grow in the soil; aërial roots are formed in the air, as the root of the orchid; water roots live in the water or in the earth, such as those of the willow, the floating duckweed and the water hyacinth; clinging roots fasten plants to some support, as those of the ivies and the trumpet creeper, and prop roots prop the stems or the wide spreading branches, as the roots of the banyan tree.

ELIHU ROOT

Rope, a general name applied to cordage over one inch in circumference. Ropes are usually made of hemp, flax, cotton, coir or other vegetable fiber, or of iron, steel or other metallic wire. A hempen rope is composed of a certain number of yarns, or threads, which are first spun or twisted into *strands*, and the finished rope goes under special names, according to the number and arrangement of the strands of which it is composed. A *hawser laid rope* is composed of three strands, twisted to the left, the yarn being laid up to the right. A *cable laid rope* consists of three strands of hawser laid rope, twisted to the right. A *flat rope* usually consists of a series of hawser laid ropes, placed side by side and fastened together by sewing in a zigzag direction. Wire ropes are made of a certain number of wires, twisted into the requisite number of strands, and are now extensively used in the rigging of ships, as well as for cables. For greater flexibility, hempen cores are used; thus, for instance, a rope of six strands may be wound around a hempen core, each strand consisting of six wires around a smaller hempen core. Steel wire makes a considerably stronger rope than iron wire.

Ror'qual, the name given to certain whales, closely allied to the common, or whalebone, whales, but distinguished by having a dorsal fin and by having the throat and under parts wrinkled with deep longitudinal folds. Two or three species are known, but they are not as valuable as the right whale, because of the shortness and coarseness of their baleen, or whalebone, and the small quantity of oil they produce. The northern rorqual attains a great size, being found as long as one hundred feet, and it is thus the largest living animal known. The rorqual feeds on cod, herring, pilchards and other fish, in pursuing which it is not seldom stranded on the shore. It occurs in the Arctic seas, especially north of Europe and Asia. See WHALE.

Ro'sa, MONTE, a mountain or group of mountains in the Pennine Alps, lying on the frontier of Switzerland, and second in altitude only to Mont Blanc, from which it is distant about 50 miles northeast. It consists of eight summits, the highest being Dufourspitze, 15,217 feet. The mountain is covered with snow and on one side has the great Görner glacier. In 1904 an observatory was established on Monte Rosa at an altitude of 15,000 feet.

Rosa, SALVATOR (1650–1673), an Italian painter, born near Naples. He is especially known as a painter of wild and romantic landscapes. The National Gallery in London and many other European galleries have specimens of his work, among which are *Prometheus* and *The Conspiracy of Catiline.*

Rosaceae, *ro za'se ee,* the rose family, one of the most important orders of flowering plants, containing about 90 genera and 2000 species of herbs, shrubs and trees. Most of these live in the cooler parts of the northern hemisphere, and among them are many of great value. Some of our best fruits and our most beautiful flowers belong to this family. The apple, the pear, the plum, the cherry, the peach, the almond, the nectarine, the apricot, the strawberry and the raspberry are all fruits of the rose family and differ greatly in structure, as may be seen in comparing the cherry, the apple, the peach and the hard little seeds of the rose and the strawberry. The leaves differ as much as the fruit, but the flowers have a characteristic appearance that is easily recognized, from their resemblance to the apple or strawberry blossom. Many of these fruits and flowers are described in their proper places elsewhere in this work. See ROSE.

Ro'samond, commonly called Fair Rosamond, the mistress of Henry II of England. She died in 1176 or 1177, soon after her connection with the king was openly avowed, and was buried in the church of Godstow Nunnery, whence, however, Hugh of Lincoln caused her body to be removed in 1191. Almost everything else related of Rosamond is legendary. The fable of the dagger and poison with which the jealous Queen Eleanor is said to have sought out her rival is of late origin.

Rosario, *ro sah're o,* a city of Argentine Republic, situated on the right bank of the Paraná, 170 mi. n. w. of Buenos Ayres, with which it is connected by rail. Other railway lines also connect it with the interior provinces. The city has a national college and several hospitals, theaters and asylums. The leading industries include breweries, foundries and tanneries. It is one of the chief commercial centers of the Republic and in importance ranks next to Buenos Ayres. Population, 91,700.

Ro'sary, among Roman Catholics the recitation of the Ave Maria and the Lord's Prayer a certain number of times. The name is commonly given to the string of beads by means of which the prayers are counted. The complete, or Dominican, rosary consists of 150 small beads for the aves, separated into groups of 10 by 15 large beads, for the paternosters. The ordinary rosary has only 50 small beads and 5 large beads; but if repeated thrice, it makes up the full rosary. A doxology is said after every tenth ave. The beads are of wood, ivory or stone, often of costly workmanship and of great value, or they may be berries. Rosaries are blessed by the pope, bishop and those who have special power to do it. The use of rosaries was probably introduced by the Crusaders from the East, for both Mohammedans and Buddhists make use of strings of beads while repeating their prayers; but Saint Dominic is usually regarded as the inventor in the Roman Church.

Roscius, *rosh'e us,* Quintus (?–62 B. C.), the most celebrated comic actor of Rome. He realized an enormous fortune by his acting and was raised to the equestrian rank by Sulla. He enjoyed the friendship of Cicero, who in his early years received instruction in elocution from the great actor.

Rose, the beautiful and fragrant flower which has given the name to the great family *Rosaceae.* The roses are numerous in species and difficult to distinguish one from another. They are prickly shrubs, with pinnate leaves, and in their natural state the flowers have five petals, surrounding numerous stamens. The seeds are many, are covered with a kind of down, and are attached to the interior of the calyx, which, after flowering, grows around the seeds in the form of a fleshy, globular berry. The varieties of the cultivated rose are almost endless, and more than 1000 named species are now on record. They are exceedingly popular in the United States, and many species are hardy garden plants, while for others it is necessary to have the protection of the greenhouse. Among the most common of the garden roses in this country are the *pink cabbage,* or *Provence, rose,* a very old variety of Eastern origin; the *Cherokee rose,* a native of China, with single, large, pure white flowers; the old-fashioned sweet-scented *cinnamon rose,* from Europe; the *pink damask roses,* from Damascus; the *climbing evergreen rose,* of southern Europe, with its shining leaves and brilliant flowers; the *Scotch roses,* which are of dwarf stature, but very hardy, producing early in the summer an abundant crop of red, white or yellow flowers; the common *white rose,* from the Caucasus; the common *yellow rose,* from Asia Minor, often called the Austrian brier, or yellow eglantine; the *Bengal,* or *monthly, rose,* a hardy, perpetual bloomer, with a profusion of brilliant flowers, and the *Queen of the Prairie* and *Baltimore Belle,* cultivated varieties of the wild prairie rose. In the wonderful climate of Cannes, France, the Riviera, Italy, and southern California, roses grow in a beauty and profusion that can scarcely be conceived by one who has never visited these places. There are bowers of roses, hedges of roses, and cottages and even public buildings are almost hidden by them.

ROSE

Rose growing in hothouses has become a very important industry in the United States and has been brought to a remarkable degree of perfection. Every good greenhouse has its rose house, where the plants are given the tenderest care. They require a stiff pasture loam, careful fertilization, good drainage and plenty of ventilation. Different varieties, however, require such different treatment that the florist must know thoroughly the nature of each individual plant. For the sake of convenience, the florists and botanists divide all cultivated roses into two classes—summer, or once-blooming, roses, and autumnal, or ever-blooming, roses.

There are several species of wild roses in the United States, of which the most beautiful are the *prairie rose,* the *swamp rose* and the *dwarf wild rose.* See Rosaceae.

Rose Acacia, *a ka'sha,* a highly ornamental flowering shrub, a species of locust, inhabiting the southern parts of the Alleghany Mountains, now frequently seen in gardens of Europe. The flowers are large, rose-colored and inodorous; the pods are covered with coarse, sticky hairs.

Rosebery, *roze'ber ry,* Archibald Philip Primrose, Earl of (1847–), an English statesman, educated at Eton and Oxford. In 1868 he succeeded to the earldom and entered the House of Lords. He was under-secretary at the home office from 1881 to 1883, lord privy seal and first commissioner of works in 1885, and in the next year he held the secretaryship of foreign affairs, till the fall of the Gladstone government. In 1889 he became a member of the London County Council and was appointed chairman of that body. In 1892 he became secretary of state for foreign affairs under Gladstone, and in 1894 he succeeded Gladstone as premier, holding office, however, little more than a year. He has advocated the reform of the House of Lords and is much interested in the questions of imperial federation and the social condition of the masses. He married Hannah, daughter of Baron Rothschild.

Rosecrans, *ro'ze krans,* William Starke (1819–1898), an American general, born at Kingston, Ohio. He graduated at West Point in 1842 and was employed there for a time as assistant professor. In 1854 he resigned from the army and became a civil engineer, but when the war broke out he volunteered as an aide to General McClellan. He won an action at Rich Mountain in July, was commissioned brigadier general in the regular army, succeeded McClellan as head of the troops in western Virginia and kept the Confederates out of that region. In 1862 he commanded a division at the siege of Corinth, on September 19 he defeated General Price at Iuka, and on October 3 and 4 he successfully defended Corinth against Price and Van Dorn. Later in 1862 he was placed in command of the Department of the Cumberland. In the Battle of Murfreesboro against Bragg, he by his personal exertions converted what had nearly been a defeat into a victory; but at Chickamauga, in September, 1863, he was defeated by Bragg, with great loss. Rosecrans was succeeded in his command by General Thomas, but in 1864 he was placed over the Department of Missouri and repelled Price's invasion of that state. He was shortly relieved of all command and resigned from the army at the close of the war. In 1868 he was made minister to Mexico, in 1880 and in 1882 he was elected a member of Congress and from 1885 to 1893 he was register of the United States treasury.

Rosemary, *roze'ma ry,* a shrubby, aromatic plant, of the mint family, a native of southern Europe. It has dark green leaves, with a white under surface, and pale blue flowers in graceful sprays. At one time of considerable repute for medicinal purposes, rosemary is now esteemed chiefly for yielding, by distillation, the aromatic perfume known as oil of rosemary. Throughout Europe the rosemary is woven into both marriage and funeral wreaths, as it is an emblem of remembrance and fidelity.

Rose of Jericho. See Jericho Rose.

Roses, Wars of the, the struggle for the crown of England, between the Lancastrians, whose emblem was the red rose, and the Yorkists, whose emblem was the white rose (See Lancaster, House of; York, House of). The war lasted with short intervals of peace for thirty years, from 1455, the date of the Battle of Saint Albans, to the Battle of Bosworth, in 1485. Henry VI, who was king at the outbreak of the struggle, was deposed, reinstated and again deposed, while the head of the Yorkist faction, Edward IV, managed with but a short interval to hold the throne from 1461 to 1483. After the accession of Richard III (See Richard III), a rising occurred under the duke of Richmond, head of the House of Lancaster, which drove Richard from the throne.

Rosetta, *ro zet'ta,* **Stone,** a tablet of black basalt, bearing an inscription in three versions, in honor of Ptolemy Epiphanes, written about 196 B. C. It furnished the key for the deciphering of the hieroglyphic inscriptions. The stone, discovered by the French near Rosetta, Egypt, in 1799, is now in the British Museum.

Rosetta Wood, a handsome furniture wood, of an orange red color, with very dark veins, imported from the East Indies. It is of durable texture, but the colors become dark by exposure. The tree yielding it is not known.

Rose Window, a circular window, divided into compartments by mullions and tracery radiating from a center, also called *Catharine wheel* and *marigold window,* according to the modifications of the design. It forms a fine feature in the church architecture of the thirteenth and fourteenth centuries, and it is mostly employed in the triangular spaces of gables. In France it is much used, and notwithstanding difficulties of construction, it has attained great size. Fine examples are to be seen in the cathedrals of Paris, Rheims and Amiens.

Rosewood, a name given to the wood from several very different trees, though most of them belong to the pulse family. The rosewoods are usually of a deep rose color, marked with dark lines, which under polishing become almost black. The woods are used in veneering furniture and in making the cases of pianos and other musical instruments. The best wood is obtained from Brazil, the East Indies and Africa. The odor of rosewood is noticeably like that of roses, and from this fact the name is derived.

Rosicrucians, *roz e kroo′shans,* members of a secret society, the first account of which was published early in the seventeenth century in two books, now generally ascribed to J. V. Andreae, a Lutheran clergyman of Württemberg. Many regard Andreae's writings as merely a veiled satire on his own times and deny altogether the actual existence of any such society, in spite of the fact that since his day many persons have professed to belong to it. The aim of the Rosicrucians, or Brothers of the Rosy Cross, was said to be the improvement of humanity by the discovery of the "true philosophy," and they claimed a deep knowledge of the mysteries of nature, such as the permutation of metals, the prolongation of life, the existence of spirits and the events occurring in distant countries. The secret of the order, if it ever existed, has been faithfully guarded by its members; and the general cloud of mystery shrouding its history and objects has made it the subject of much curiosity. Some regard Rosicrucianism as the origin of freemasonry.

Rosin, *roz′in,* the name given to the resin of cone-bearing trees, employed in a solid state for ordinary purposes. It is obtained from turpentine by distillation. In the process, the oil of the turpentine comes over and the rosin remains behind. There are several varieties of rosin, varying in color from the palest amber to nearly black and from translucent to opaque. Rosin differs somewhat, according to the turpentine from which it is derived, this being obtained from numerous species of pine and fir. Rosin is a brittle solid, almost flavorless, and it has a characteristic odor. It is used in the manufacture of sealing wax, varnish, cement, soap, for soldering and in the manufacture of various kinds of plaster and cement. See RESINS; TURPENTINE.

Ross, ALEXANDER (1783–1856), a Canadian pioneer and author. He went to Canada from Scotland in 1805, joined Astor's expedition to Oregon in 1810 and was afterward a fur trader in the Hudson Bay Company's service. He is the author of *Adventures of the First Settlers on the Oregon, The Fur Hunters of the Far West* and *The Red River Settlement.*

Ross, JAMES CLARK, Sir (1800–1862), an Arctic and Antarctic explorer, born in London. He entered the British navy at the age of twelve, accompanied his uncle. Sir John Ross, on his two voyages in search of a northwest passage and in the interval between them accompanied Captain Parry in his three Arctic voyages. He was promoted to the rank of post captain in 1834, particularly for the determination of the position of the north magnetic pole. He commanded the expedition in the *Erebus* and *Terror* to the Antarctic Ocean in 1839–1843, and on his return he published a narrative of that voyage, which contributed largely to geographical and scientific knowledge. Ross was knighted for his services and received numerous other honors. In 1848 he made a voyage to Baffin's Bay, in search of Sir John Franklin.

Rosset′ti, CHRISTINA GEORGINA (1830–1894), an English poet, the sister of Dante Gabriel Rossetti. Her life was uneventful, and her time was spent almost wholly in literary work and in religious devotions. Many of her best poems are distinctly religious in tone and she also wrote a number of religious articles in prose. *Goblin Market and Other Poems, The Prince's Progress and Other Poems* and *A Pageant and Other Poems* were in the main well received at their publication, and present day criticism assigns to Christina Rossetti a place even higher than that which contemporary criticism accorded her. Among women writers in England in the nineteenth century she ranks next to Mrs. Browning. *Up Hill* and *Passing Away* are among her best poems.

Rossetti, GABRIEL CHARLES DANTE (1828–1882), better known as Dante Gabriel, an English painter and poet, born in London, the son of an Italian patriot, who was a refugee in England and a professor in Oxford. He early showed a genius for art, studied in the Royal Academy and later became a pupil of Ford Madox Brown. His intensity of feeling in both painting and poetry gathered around him a small group of painters, among whom were Holman Hunt, Thomas Woolner, Millais and others, who founded the so-called *Pre-Raphaelite Brotherhood,* with Rossetti as their leader. This group advocated a return to the purity and idealism of the old masters before Raphael, and their effort was to ennoble art and to give their work sincerity. Other painters who have continued the practice of these principles are called Pre-Raphaelites (See

Burne-Jones, Edward). In 1849 Rossetti exhibited his painting of the *Girlhood of Mary Virgin*; but his later works, numerous as they were, were rarely seen by the public until the posthumous exhibition of a collection of his paintings in 1883 at the Royal Academy. His principal paintings are *Dante's Dream, Salutation of Beatrice, Dying Beatrice, La Pia, Proserpine, Sibylla Palmifera, Monna Vana*, and *Venus Verticordia.* In most of his pictures he has represented the face of his wife, to whom he was very devoted. His subjects are generally religious or mystical and reveal wonderful imaginative sentiment and wealth of color.

Rossetti is even more famous as a poet. In both arts he appears as a devotee of medievalism. His chief poems are the *House of Life*, a poem in 101 sonnets; the *King's Tragedy and Other Ballads*; *Dante at Verona* and *The Blessed Damozel.* In 1861 he published the *Early Italian Poets*, a series of translations in the original meters, afterward reissued under the title of *Dante and his Circle.* His brother William Michael was a distinguished art critic and literary editor, and his sister Christina was a poetess and prose-writer of high merit.

Rossini, Gioachino Antonio (1792–1868), an Italian composer, born at Pesaro. He wrote a great number of both comic and serious operas, the first successful one of which was *Tankredi* (1813), and he gained both fame and wealth. He resided at different times in London, Paris, Naples, Florence and Bologna and became constantly broader in spirit and method, until he was one of the most noteworthy of modern musicians. His finest opera is *William Tell* (1829), which contains some of the most spirited passages in all music. Other works are the operas, *Othello* (1816) and *Semiramide* (1823); the comic opera, *Barber of Seville* (1816), and a famous *Stabat Mater.*

Ros'tock, a seaport of Germany, chief town of Mecklenburg-Schwerin, 80 mi. e. n. e. of Lübeck, on the Warnow, 9 mi. from its mouth. It is still quaint and medieval in its aspect. Among the chief buildings of the town are the twelfth century Saint Peter's Church, the grand ducal palace, the townhall, with its many turrets, and the new university building. The university is one of the three oldest in Germany, and it usually has an enrollment of about 550. The commercial importance of the town lies largely in the fact that it is an important port. Live stock, grain and wool are exported, and machinery, sugar, chemicals and tobacco are manufactured. Population in 1900, 54,713.

Rot, a disease afflicting sheep and occasionally other domestic animals. It is caused by the presence in the gall bladder of a parasite known as the liver fluke, which is developed from germs swallowed by the animals with their food. The average length of the fluke is about one inch. Several dozen of these parasites may sometimes be found in the liver of a single sheep. Damp atmosphere or damp soil or fodder promote the disease, which in almost all cases proves fatal.

Rota'tion, in physics, the motion of a body about an axis, so that every point in the body describes a circular orbit, the center of which lies in the axis. Rotation is thus distinguished from revolution, or the progressive motion of a body revolving round another body or external point. If a point, which is not the center of gravity, be taken in a solid body, all the axes which pass through that point will have different moments of inertia, and there must exist one in which the moment is a maximum, and another in which it is a minimum. Those are called the *principal axes of rotation.* When a solid body revolves round an axis, its different particles move with a velocity proportional to their respective distances from the axis, and the velocity of the particle whose distance from the axis is unity is the *angular velocity of rotation.*

Rotation of Crops, the practice in agriculture and horticulture of growing different crops upon the same piece of land in succeeding years. The rotation of crops prevents exhausting the soil of any one kind of plant food, since one crop, as wheat, will use a larger proportion of a certain food than another crop, like potatoes. It also prevents rank growths of weeds, as a crop which cannot be tilled may be followed the next season by one which will admit of tillage for a number of weeks. It also prevents insect pests and plant diseases, since a disease which preys upon one kind of plants will not affect another kind. For instance, rust and cinch bugs destroy wheat. If wheat is followed by a crop like clover, the disease and the insect will disappear. In planting the crops in rotation the farmer needs to be guided by the kinds of soil, the relation of the crop to his farm as a whole, the probability of marketing the product and the economy of labor connected with raising various crops.

Rothschild, *rote'shilt* or *roths'child,* a famous family of financiers and bankers. Mayer Anselm (1743–1812), the founder of the family, was born in Frankfort-on-the-Main. He proved most successful in his management of the fortune of the elector of Hesse-Cassel, and his family was given the patronage of the elector. All five of the sons of Mayer Anselm were made barons by the emperor of Austria. These five sons founded banking establishments in five of the large cities of Europe and established agencies at other places, both in Europe and in America. LIONEL (1808–1879), a grandson of the first Mayer Anselm, was born in London and became the head of the London house of Rothschild. He was several times elected to Parliament, but each time he was refused the right to take his seat, because he declared he could not conscientiously repeat the last words of the oath—"on the true faith of a Christian." At last, after a lengthy agitation, which virtually brought about Jewish emancipation in England, he was permitted to take his seat in 1858. The various banking establishments are still carried on by the descendants of the five Rothschild brothers.

Rotten Stone. See TRIPOLI.

Rot'terdam, the chief commercial port of the Netherlands and the second largest city, situated in the Province of South Holland, on the Meuse River, about 15 mi. s. e. of the Hague and 44 mi. s. s. w. of Amsterdam. The city is divided into two parts by High Street. The old quarter is filled with quaint wooden buildings, while the new part is laid out with wide, well-kept streets, lined with substantial buildings. The principal buildings are the Groote Kerk, a fifteenth century church in the Gothic style, the exchange, the townhall, the courthouse and the postoffice. North of the city is the large zoölogical and botanical garden, and west of the city is a beautiful park.

Shipbuilding constitutes the principal industry of Rotterdam, but others of importance are the manufacture of cigars, spirits, paints, chemicals and sugar. Rotterdam has a great system of docks and harbors, and the location of the city makes it an important center of maritime trade. The chief imports through Rotterdam are grain, ores, metals, coffee, tea, oil, tobacco and cigars. The same articles are reshipped for export, along with lumber and some animal products. Population in 1900, 318,507.

Roubaix, *roo bay',* a city of France, situated in the Department of Nord, 7½ miles n. e. of Lille. It is important principally as a center of the manufacture of textiles, the annual value of these products being about $80,000,000. The town is the seat also of the National School of Industrial Arts. Population in 1901, 124,365.

Rouen, *roo ahN',* a city of France, situated on the Seine, 84 mi. n. w. of Paris and 56 mi. e. s. e. of Havre. The town is characterized by crooked, though picturesque, streets, and old houses, with quaint gables and carved timbers. Many specimens of medieval architecture have been retained, though in the newer part of the town the old streets and buildings have given way to broad boulevards and modern structures. The city contains the finest Gothic cathedral in France, and other churches worthy of note are the Church of Saint Ouen, the Church of Saint Maclou, the Church of Saint Vincent, noted for its stained glass, and the Church of Saint Patrice, also noted for its windows. Other buildings of note are the Palais de Justice, the Hotel de Ville and the archbishop's residence. The public library contains 140,000 volumes, and there are in the city also a number of museums of antiquities and art collections of great value. In the Place de l'Hotel de Ville, Joan of Arc was burned at the stake, and a monument to her memory stands upon the spot.

Rouen has extensive docks, second only to those of Paris, and is an important commercial and industrial center. The leading industries are cotton spinning and the manufacture of coarse cotton goods, called *rouenneries.* Following this in importance are the manufactures of silk, chemicals, soap, machinery and foundry products and the refining of sugar. The city became an important post under the Romans and was formerly the capital of Normandy. It was captured from King John of England by Philip Augustus in 1204, but was returned to the English thirty years later. Population in 1901, 110,480.

Rouge, *roozh,* a very fine scarlet powder, used by jewelers for polishing purposes and prepared from crystals of sulphate of iron, exposed to a high temperature. The name is also given to a cosmetic prepared from safflower and used in coloring the cheeks. See SAFFLOWER.

Rouge-et-Noir, *roozh a nwahr,* (French, "red and black") or **Trente-un** (*thirty-one*) or **Trente et Quarante** (*thirty and forty*), a modern gambling game played with the cards belonging to six complete packs. The players are arranged about a table covered with green cloth, on which is a diagram showing four spaces, upon which money may be placed as a bet, namely, *rouge, noir, couleur* and *inverse.* The banker then deals a row of cards for noir, until the exposed spots number between 30 and 40 (face cards count 10, aces 1), and a similar row for rouge. The row wins which most nearly approaches the number 31, and players staking on the winning color receive their stake doubled. Couleur wins if the first card turned up in the deal is of the winning color; in the contrary case inverse wins. When the number of spots in both rows are equal it is a *refait*, or tie, and a fresh deal is made; but if both happen to count exactly 31 the banker claims one-half of all stakes. This last condition places the banker at an advantage, calculated to be equal to about 1¼ per cent on all sums staked.

Rough Riders, the name given to the first regiment of United States volunteer cavalry in the Spanish-American War. It was organized by Theodore Roosevelt, who resigned his position as first assistant secretary of the navy to become lieutenant colonel. The regiment was composed largely of cowboys. It won particular distinction at the battles of El Caney and San Juan. In 1899 a patriotic hereditary society was organized, to which members of the Rough Riders and their descendants were admitted.

Roulette, *roo let'*, (French, "little wheel"), a game of chance, in which a small ivory ball is thrown off by a revolving disk into one of 38 compartments surrounding it, numbered from one to thirty-six, with two zeros. Players who have staked upon the number of the compartment into which the ball falls receive thirty-six times their stake; they receive less if they have staked upon more than one number. There are also other chances on which stakes may be placed.

Rounders, a game played by English boys, with a bat and a ball, on a piece of ground marked off into a square or circle, with a batter's station and three goals, all at equal distances. On the ball being thrown toward him the batter tries to drive it away as far as he can and run completely round the goals, or over any one of the four parts, before the ball can be thrown back to the batting station. The batter is declared out if he fails to secure a run after having had three balls, if a fielder returns the ball so as to strike him while running, or if the ball from his bat is caught in the air by one of the fielders. This game is the origin of the American national game of baseball.

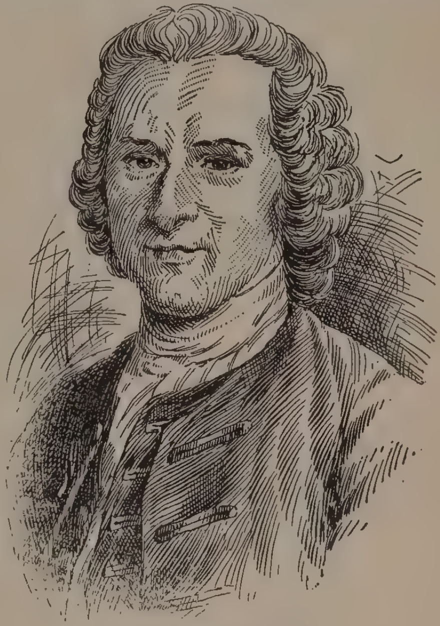
Round Fish, a name sometimes applied to the common carp, the pilate fish and also to the Menominee whitefish.

Roundheads, a name given by the Cavaliers, or adherents of Charles I, during the English civil war, to members of the Puritan, or Parliamentary, party, who distinguished themselves by having their hair closely cut, while the Cavaliers wore theirs in long ringlets.

Round Table, the name given to the table about which Arthur's knights took their seats, and, in consequence, to the fraternity of knights itself. See ARTHUR, KING.

Round Towers, a class of tall, stone, circular edifices, tapering somewhat from the base upward, and generally having a conical top, from 60 to 130 feet in height and from 20 to 30 feet in diameter. The doors are from six to twenty feet from the ground, and the windows are small. The interior contains no stairs, but the successive stories are reached, like the doors, by means of ladders. These towers are found chiefly in Ireland, but also in Scotland, Switzerland and other countries. Authorities are now largely agreed that they were works of a Christianized race, erected as places of refuge and as watch-towers. They date from a period ranging from the eighth or ninth to the thirteenth century.

Rousseau, *roo so'*, JEAN JACQUES (1712–1778), one of the most celebrated and most influential French writers of the eighteenth century. For the first thirty-five years of his life the chief authority is his own painfully frank, but perhaps not absolutely accurate *Confessions*, first published in 1782 and 1789. His youth gave little promise of his future eminence, and after a desultory edu-



JEAN JACQUES ROUSSEAU

cation he was apprenticed to an engraver, from whose real or fancied severity he ran away. He then fell under the notice of Madame de Warens, who sent him to a Roman Catholic institution at Turin, where he abjured Protestantism. After several fits of eccentric wandering, he went to live with Madame de Warens at Les Charmettes, a country-house near Chambéry, where they appear to have lived happily for nearly three years. In 1741 he went to Paris, and in 1743 he obtained the post of secretary to the French ambassador at Venice. This office he resigned, and he returned to Paris in 1745, to lead a precarious life, copying music and studying science. About this time he became intimate with Diderot, Grimm, D'Holbach, Madame D'Epinay and other persons of influence, and he contributed to the *Encyclopédie.* From this period, also, dated his connection with Thérèse Levasseur, with whom, twenty-five years later, he went through some form of marriage ceremony.

In 1750 his essay, in which he adopted the negative side of the question whether civilization has contributed to purify morals, won a prize offered by the Academy of Dijon and brought him for the first time into general notice. In 1754 he revisited Geneva, where he was readmitted a free citizen on once more embracing Protestantism. Having returned to Paris he wrote a sort of novel, *Julia, or the New Heloise,* which was followed by *The Social Contract,* a political work, and *Emile, or on Education,* which on the framework of a story builds up an elaborate system of education. Pestalozzi and Froebel drew much of their inspiration from this work, and it may be said to have laid the foundations of modern elementary education. In spite of immense popular approval, these works were condemned by the government of Paris, and the resulting persecution, exaggerated by his own morbid sensibility, forced Rousseau to flee to Neuchâtel, then to the island of Saint Pierre, in the Lake of Bienne, and finally to England, where he was welcomed by Hume, Boswell and others. In 1767, having quarreled with Hume, he returned to France, where his presence was now tolerated. He lived in great poverty, supporting himself by copying music and publishing occasional works. In May, 1778, he retired to Ermenonville, near Paris, where he died in the following July. His celebrated *Confessions* appeared at Geneva in 1782. The chief importance of his works lies perhaps in the fact that they contain the germ of the doctrines which were carried out with such ruthless consistency in the French Revolution.

Rowan, *ro'an,* **Tree.** See MOUNTAIN ASH.

Rowing, *ro'ing,* the art of propelling a boat by means of oars. That part of rowing which takes place while the oar is in the water is specifically called the *stroke;* while *feathering* is the act of turning the blade of the oar so that it is nearly parallel to the surface of the water, and carrying it thus through the air into position to repeat the stroke. Technically, the word *rowing* is used by boating men only when each oarsman has but a single oar; when he has one in each hand, he is said to *scull,* and the oars are called sculls.

Although rowing is certainly one of the most ancient methods of propelling vessels, it has only in comparatively recent times come into prominence as a form of sport. Boat racing practically dates from the first quarter of the nineteenth century, and its development has lain almost entirely in the hands of the Anglo-Saxon races. The Thames has always been the leading resort of amateur oarsmen. The first boat race between Oxford and Cambridge Universities took place in 1829; the second, in 1836; and since 1856, the contest has been annual, the course (since 1864) being from Putney to Mortlake, about four and a half miles. Of the very numerous amateur regattas which are held all over Great Britain, the chief is that at Henley-on-Thames, held annually since 1839. In Great Britain rowing by amateurs is now generally conducted under the rules of the Amateur Rowing Association, founded in 1879 and recognized by all the chief clubs. Holland, Germany and other countries have rowing clubs of importance; and foreign oarsmen have competed from time to time at British regattas, without great success, however. In the United States the first amateur rowing club was founded in 1834, but the sport did not make much progress until the universities of Yale (in 1843) and Harvard (in 1844) took it up. The chief regatta is held on different courses in different years by the National Association of Amateur Oarsmen, founded in 1873. There have been a number of international rowing contests in which American crews have contested for prizes in British waters, and in which British crews have rowed in the United States against college teams, in most of which the English have won. Racing boats are known as *eights, fours, pairs,* according to the number of rowers. *Sixes* and *double scullers* are more common in America than in Great Britain. See RACING.

Rowland, *ro'land,* HENRY AUGUSTUS (1848–1901), a distinguished scientist, born at Honesdale, Pa., and educated at Rensselaer Polytechnic Institute at Troy, N. Y. He was elected professor of physics in Johns Hopkins University in 1876 and held the position until his death. During his travels in Europe he studied the methods of instruction in different educational institutions and carried on extensive scientific research. To Professor Rowland is due, in great measure, the world-wide reputation of Johns Hopkins University as a great scientific school. Rowland became widely known through his inventions and discoveries in science. He was the originator of the multiple telegraph instrument and also succeeded in making the most perfect photographs of the solar spectrum ever secured.

Royal Gorge, *gorj,* a famous canyon through which the Arkansas River flows, in Fremont County in central Colorado. It is about 3000 feet deep and is one of the most picturesque gorges in America.

Royal Institution of Great Britain, an organization founded in 1799, incorporated by royal charter in 1800, for diffusing knowledge, for facilitating the general introduction of mechanical inventions and for teaching the application of science to the common purposes of life. The members are elected by ballot and pay an admission fee and annual subscription. The buildings at Albemarle Street, Piccadilly, London, contain a laboratory, a library and a museum, and among the lecturers occur the names of Dr. Thomas Young, Sir Humphry Davy, Faraday, Tyndall, Lord Rayleigh, Huxley, Carpenter and other eminent men.

Royal Society (London), The, the oldest learned society outside of Italy, founded for the study and promotion of natural science, in 1660. Meetings are held weekly from November to June, for the purpose of reading and discussing scientific papers; and the more important of these are published in the annual *Philosophical Transactions,* first issued in 1665, and now forming a most valuable series. Accounts of the ordinary meetings, with abstracts of papers, appear also in the periodical, *Proceedings,* begun in 1800. Scientific research has at all times been both initiated and encouraged by the Royal Society, and many of the most important scientific achievements and discoveries have been due to its methods. It deservedly enjoys an influential and semi-official position as the scientific adviser of the British government. The society has an independent income from property of about $20,000, besides the annual subscriptions of $20 from each fellow. It awards the Copley, Davy and two royal medals, annually, and the Rumford medal, biennially, for distinction in science; the first being the blue ribbon of scientific achievement, bestowed both on foreign and British savants. The roll of the Royal Society contains practically all the great scientific names of its country since its foundation. Among its presidents have been Lord Chancellor Somers, Sir Isaac Newton and Sir Humphry Davy.

Rubaiyat, *roo boi'yat.* See Omar Khayyam.

Rubber. See India Rubber.

Rubber Manufacture. When the crude rubber arrives at the factory, the manufacturer first cleans the rubber, for bits of leaves, pieces of bark, earth, stones and other foreign substances are mixed with it. This is done by means of a washing machine, which consists of a pair of toothed rollers, over which a perforated water pipe hangs. The crude rubber is cut, squeezed and mashed between the rollers, and a spray of water carries off the impurities. The rubber comes from the washing machine in irregular strips, rough as bark. The mixing machine, to which the rubber is taken next, has a pair of steel rollers, over which is a box filled with the compound which the rubber maker mixes with the pure rubber. It is at this stage of the manufacture that reclaimed rubber, obtained from old rubbers, overshoes, hose and other articles, is introduced. In the compound also is the sulphur which *vulcanizes* the rubber and gives it the preservative qualities. The washed rubber mechanically combines with the composition in the mixing machine, and it is then either taken to the rolls, where the rubber is coated on duck, or to the machine, which kneads the rubber, preparatory to pressing it into molds. At no stage of the process is the rubber ever melted. It is warmed at times, but molded solid rubber goods are pressed into molds, not poured in. A large proportion of the rubber goods consists of duck or canvas, coated with rubber. This is done in a friction machine, which consists of iron or steel rolls, placed one over the other, in which the duck and rubber are pressed together. As the duck passes between the rollers, the sheet of rubber is laid on top and is pressed into the duck. The pressure is so great that the duck and rubber become almost one material.

Hose is made in fifty-foot lengths, from two to ten ply, and it is all made on iron mandrels, or rods, which are the same size as the inside diameter of the hose. A strip of pure rubber fifty feet long and just wide enough to double around the mandrel, is first wrapped around the iron rod, and, as the fresh-cut edges are touched with naphtha, the rubber unites and forms a pure rubber pipe, which is afterward the inside of the hose. The rubber-coated duck is next wrapped around the pure rubber pipe, which is still on the mandrel; if the duck is wrapped around twice, the hose is two-ply; if four times, it is four-ply .The duck is wrapped around the mandrel by machinery, and small rollers press the edge of the duck through its entire length. Another strip of pure rubber is then put around the duck, for the outside, and the hose still on the mandrel is put in the "heater." Steam is admitted to the heater, and the sulphur in the compound becomes mechanically united with the rubber, and the rubber is *vulcanized.* The hose is kept in the heater for a half to three-quarters of an hour, and then it is taken from the mandrel. Air is admitted between the hose and the mandrel, and the hose, expanded by the air, slips off easily.

Rubber belting for machine shops and factories is made from rubber-coated duck. Rubber bands sold by stationers are cut from pure rubber hose, which is placed in a mandrel on a lathe. As it revolves, a knife cuts off sections of the hose, and these narrow sections are the rubber bands. The large perforated rubber mats, which cover the floors of halls and rotundas in business blocks, are cut out by hand. The thick rubber sheet is laid on a block, and with different shaped dies the pattern is punched out.

Ru'bens, Peter Paul (1577–1640), the most eminent painter of the Flemish school. His bent toward painting early revealed itself, and under his first masters, Verhaegt, Adam Van Noort and Otto Van Veen, he made rapid progress. In 1598 he was admitted as a master of the guild of painters in Antwerp. In 1600 he went to Italy, where he remained till 1608, chiefly at the court of the duke of Mantua. On his return to the Netherlands, his reputation was already great, and the archduke Albert attached him to his court, with a salary of 500 livres. In 1621 he was employed by Marie de' Medici, to design for the gallery of the Luxembourg the well-known series of magnificent allegorical pictures illustrating the life of that princess. After 1626 he was employed by the archduchess Isabella, in endeavoring to arrange a truce between Spain and the Netherlands, and two years later he was sent to England, to assist in the important private negotiations of a peace between Spain and England. While at Madrid he painted several pictures and a fine portrait of the king, Charles I, for which he was richly rewarded and received the honor of knighthood.

Rubens was indisputably the most rapid of the great masters and was remarkable for his fondness far large canvases. His great characteristics are freedom, animation and a striking brilliancy and disposition of color. The *Descent from the Cross,* in Antwerp Cathedral, is generally considered his masterpiece. His pictures number upward of two thousand, the best of which are at Antwerp and Munich. Among them are *Adoration of the Magi, The Massacre of the Innocents* and *The Crucifixion between the Two Thieves.*

PETER PAUL RUBENS

Ru'bicon, a small river in northern Italy, which enters the Adriatic 9 miles northwest of Rimini. Its length is only about 20 miles. It is important in history because it formerly constituted the boundary between Italy and Cisalpine Gaul. When Caesar led his army across this river, he virtually declared war against the Republic. From this event the phrase, "to cross the Rubicon," has come to mean to take a decisive step which commits one to a hazardous enterprise.

Rubid'ium, a rare metal, discovered by Bunsen and Kirchhoff in 1860, by spectrum analysis. It is a white, shining metal, and at ordinary temperatures it is as soft as wax. It is usually found in connection with caesium, and it belongs to the group of the alkali metals.

Rubinstein, *roo′bin stine,* Anton Grigoryevitch (1830–1894), a Russian composer and pianist. After making several successful tours of Europe, he returned to Russia in 1848 and devoted himself to further study and to composing. On his reappearance in concert, his fame was at once assured by his phenomenal technique. He assisted largely in the foundation of the Saint Petersburg Conservatoire in 1862, and he was its principal until 1867. As a composer Rubinstein was exceedingly prolific, being especially successful in his pianoforte pieces. His operas had but a qualified success. His best-known work is probably the *Ocean Symphony.*

Ru′ble, a silver coin, the standard of money in Russia, equal to about 51.5 cents of United States money. A ruble is divided into 100 copecks. Half rubles and quarter-rubles and smaller silver coins are also issued, but in actual circulation there is little but paper money, current at two-thirds its nominal value, in accordance with an imperial ukase of 1897. The gold imperial is worth 10 rubles, the half-imperial 5 rubles. Russia adopted the gold standard in 1897, but no gold unit has yet been coined.

Ru′by or **Red Sapphire,** a precious stone of a deep red color, of which there are two varieties, the oriental and the spinel. The *oriental ruby,* or *true ruby,* is a corundum, formed nearly exclusively of alumina; it is of great hardness and, next to the diamond, is the most valuable of all precious stones. Oriental rubies are found chiefly in Burmah and Siam; inferior specimens have also occurred in North America and Australia. *Spinel rubies* consist of an aluminate of magnesium and are much inferior to the true rubies in hardness and value. They are found in Burmah, Ceylon and Australia. A lighter-colored variety, discovered in Badakshan, is known as the balas ruby. See Precious Stones.

Rudder Fish, a fish allied to the mackerel, very common in the Atlantic and Pacific oceans, so named from its habit of swimming around the sterns of ships, attracted, doubtless, by the refuse thrown overboard. The flesh is said to be strong in flavor. The name *log-fish* is also often applied to this fish.

Rude, François (1784–1855), a noted French sculptor, born at Dijon, one of the most important representatives of the modern school. After studying at the Ecole des Beaux Arts, in Paris, he went to Rome to study. On his return to Paris, in 1828, he exhibited the well-known *Mercury Fastening his Sandal* and the *Neapolitan Fisher Boy,* both of which attracted considerable attention. His greatest work is his group *Le Depart* (The Departure), executed for the Arc de Triomphe de l'Etoile. It represents the departure of the volunteers from Paris in 1792 and is generally regarded as the finest example of French sculpture.

Ruff, a wading bird, from ten to twelve inches in length, which varies greatly in color, being principally brown, with white on the wings and belly. In the breeding season there appears on the neck of the male a group of long plumes, which, when raised, form a kind of ruff, which has given its name to the bird. During the same season the male becomes very pugnacious, ready to fight any approaching bird or enemy. The females, who are more uniform and modest in coloring and lack the ruff, are called reeves.

RUFF

Rug′by School, one of the most noted of the English public schools, established at Rugby in 1567, under the will of Lawrence Sheriffe. Owing to contentions between the trustees and the descendants of the founder, the school remained in obscurity during the first century of its existence. Its wide reputation is due to the work of Thomas Arnold, who became head master in 1829 and completely revolutionized the system of instruction and discipline, placing both upon a much higher plane than English schools had previously known. Arnold's successors have followed his plan, and the school now takes high rank among English institutions. The course of study gives most attention to classics, but includes science, modern language and mathematics. The number of students is about 600. The best description of life in this school during Arnold's administration is found in *Tom Brown's School Days,* by Thomas Hughes, one of the most celebrated graduates of the institution. See Arnold, Thomas.

Rü′gen, an island situated in the Baltic Sea and belonging to Prussia. It is separated from the mainland by a strait only a mile wide. The area of the island is 362 sq. mi. Rügen is the largest of the German islands. It is noted for its fine scenery and excellent sea bathing and is a favorit summer resort. Population in 1900, 46,270.

Ruisdael, *rois′dale,* JACOB VAN. See RUYSDAEL, JACOB VAN.

Rule of Three. See PROPORTION.

Rum, a strong alcoholic liquor, obtained by distillation from the skimmings and the molasses formed in the manufacture of cane sugar. The pure distilled spirit is colorless and receives its brown tint from the addition of caramel. Rum is obtained chiefly from the West Indies and British Guiana; the best sort is named *Jamaica rum,* no matter where manufactured. *Pine apple* rum is ordinary rum flavored with sliced pine apples; *tafia* is an inferior French variety of rum.

Ruma′nia, a kingdom situated in the southeastern part of Europe and extending from latitude 43° 40′ to 48° 15′ north. It is bounded on the n. by Austria-Hungary; on the e. by Russia and the Black Sea; on the s. by Bulgaria, and on the w. by Servia and Austria-Hungary. The area is 50,540 sq. mi., or a little more than that of the State of New York.

The Carpathian Mountains form most of the boundary between Rumania and Hungary and constitute an unbroken barrier. Spurs of these mountains extend into the country for short distances, but in the main Rumania is an extensive low plain. The northern portion is occupied by a tableland, which slopes toward the south and in which the rivers have worn deep channels. The southern part of the country slopes from the Carpathians, or Transylvanian Alps, toward the Danube. The eastern portion, along the Danube, is low and marshy and rises but little above the level of the sea. The Danube forms nearly the entire southern boundary and that portion of the western boundary which separates the country from Servia. Near the eastern end of Rumania the Danube flows northward and then again eastward into the Black Sea (See DANUBE). The important tributaries are the Aluta, the Dinbowitza and the Jalomitza, draining the southern part of the country; and the Sereth and its tributaries, draining the northern part.

The climate is similar to that of the adjoining portion of Russia. The winters are intensely cold, the thermometer sometimes falling as low as 20° below zero. The summers are hot, and the rainfall is irregularly distributed throughout the year, being heaviest in June, while the late summer months are usually dry. The mean annual temperature at Bucharest is 51°, and the mean temperature for July, 73°.

The country is rich in minerals, though its mineral resources have been but slightly developed. Gold is found in the beds of some of the streams. There are also ores of iron, lead, clay, silver, copper and manganese. In the mountainous regions are coal measures and important oil fields. Salt is found in large quantities and has been mined for ages. Marble of excellent quality occurs, as do clay and sand suitable for glass and porcelain ware. These and common building materials are widely scattered over the country. Until recently, only the salt and coal industries were at all developed, but in 1900 there was a beginning in the mining of petroleum, and the output now exceeds 225,000 tons annually.

The lowlands are covered with a fertile soil, and agriculture is the leading occupation, giving employment to about seven-tenths of the population. Rumania is one of the most important grain-producing countries in Europe and raises large quantities of wheat and Indian corn, the annual crop of the former being about 75,000,000 bushels, and of the latter, about 117,000,000 bushels. Grapes and other fruits are grown in the foothills of the mountains, and large quantities of wine are made. Prunes are also extensively cultivated. Considerable attention is given to the raising of live stock, and large numbers of horses, cattle, sheep and swine are grown and exported. Notwithstanding all of its natural advantages, agriculture in Rumania is in a backward state. The most primitive implements and methods are used, except upon the large estates, where modern machinery is being introduced. Stock raising is attended with but little skill, and comparatively poor returns are received for the labor and capital invested. The manufactures are limited and are almost wholly carried on by the people in their houses, the products being scarcely sufficient to supply local demands. There are a few large modern factories, and numerous flouring mills turn quite a proportion of the wheat into flour, which is exported to England and other European countries.

The Danube is the chief waterway and serves as an important means of transportation for the produce of the country. Lines of railway also extend through the country from north to south and from east to west and connect its leading cities with those of Russia and Austria-Hungary. There are about 2000 miles of railway, all of which is owned by the government. The exports consist of wheat, corn, wine and other agricultural products; and the imports are manufactured goods, machinery and such foodstuffs as are not profitably grown within the country.

The government is a constitutional monarchy, the throne being hereditary in the male line of descent. The king is assisted by a cabinet of eight ministers, and the legislative power is vested in a Senate and a Chamber of Deputies, the members of each being chosen by ballot. The Senate consists of 120 members, elected for eight years, and the Chamber of Deputies, of 183 members, elected for four years. The voters are divided into classes, called electoral colleges, the class distinctions being based upon property owned, the amount of taxes paid or educational qualifications.

The orthodox Greek Church is the State Church, but it is independent of the organizations in other countries, and its primate is appointed by the legislature and confirmed by the king. All other forms of worship are allowed. In general, the schools are poor and the percentage of illiteracy is very high, more than 80 people out of every 100 being unable to read and write. The higher institutions of learning consist of the university at Bucharest and another at Jassy.

The Rumanians, or Wallachs, constitute the greater part of the inhabitants. Their origin is not known, but they are supposed by many to be descendants from the Roman colonists who were sent into the Province of Dacia. Besides those in Rumania, others are found in quite large numbers in the surrounding countries. The language, which is known as Ruman, closely resembles the Latin. The population is about 6,000,000, including over 250,000 Jews and about 200,000 Gypsies, besides a large number of Hungarians, Bulgarians, Turks, Germans, Greeks and Armenians. The chief towns are Bucharest, the capital; Galatz, Jassy and Crajova.

The territory now included in Rumania was occupied in ancient times by a people called Dacians, and formed a part of the Roman Province of Dacia. During the Middle Ages the independent principalities of Moldavia and Wallachia were organized out of the territory. Later these became tributary to Turkey, but during the nineteenth century Russian aggression brought them under the influence of the czar. The Rumanians endeavored to secure their independence, and after the Crimean War the two principalities united in 1859, but continued tributary to Turkey until the Berlin Treaty in 1878, when the European powers acknowledged their independence. Soon after, the present government was organized.

Rumelia, *ru me' li a,* the name formerly given to a division of Turkey in Europe, which comprised ancient Thrace and a part of Macedonia. The name signifies "the land of Rome" and was given to the country because when the Mohammedans conquered the Byzantine Empire they considered the inhabitants of this part of Europe Romans.

EASTERN RUMELIA is a principality forming the southeastern part of Bulgaria, but it is not an independent political division.

Ru'minants, animals that chew their cud. When a sheep or cow or other ruminant feeds, it thrusts out its long tongue, seizes a bunch of grass and tears it off. This mouthful of grass, much mixed with saliva, is swallowed into a first stomach. Later, when at rest, the animal brings up from this receptacle a portion of grass and slowly chews it between its large molar teeth. The cud is then swallowed into a second stomach, where it is fully digested. Ruminantia is not now considered one of the chief orders, its members having been included in the more general one of Ungulata.

Rump Parliament, the name by which the remainder of the Long Parliament was known, after the expulsion of the majority of its members, in December, 1648, by Cromwell's soldiers, commanded by Colonel Pride. Only sixty members, all extreme Independents, were admitted after Pride's Purge, as it was called; and they, with the army, brought about the condemnation of Charles I. The Rump was forcibly dissolved by Cromwell in 1653, for opposing the demands of the army. Twice after this it was reinstated, but both times only for a brief period, and finally, in March, 1660, it decreed its own dissolution.

Runes, the letters of an alphabet peculiar to the ancient Teutonic peoples of northwestern Europe, found inscribed on monuments, tombstones, bracteates, rings, weapons and, rarely and at a late period, in manuscripts. They are formed almost invariably of straight lines, either single or in combination. Three runic alphabets have hitherto been recognized—the Norse, with sixteen characters; the Anglo-Saxon, with forty, and the German. Modern researches have traced the common origin of these to an older primary Germanic, or Teutonic, alphabet, with twenty-four characters.

The name is generally believed to be the same as Anglo-Saxon *rûn*, a mystery, denoting the magical or hieroglyphic character which the runic writings acquired when the lapse of time had rendered them unintelligible to the common people. Runic wands, or staves, were smooth willow wands, inscribed with runic characters and used in incantations. The period of origin and the source of runes are not known. Scandinavian and Anglo-Saxon tradition ascribes their invention to Woden. Runic inscriptions abound in Scandinavia, Denmark, Iceland and the parts of England once known as Northumbria, Mercia and East Anglia, but they are also found beyond these limits. Weapons and instruments, inscribed with runes and dating from 300 to 400 A. D., have been dug up in Norway. The use of runes gradually disappeared under the influence of the early Christian missionaries, who proscribed them on account of their magical reputation; but in England some Christian inscriptions have been found in the runic characters. The latest runic inscriptions in Sweden date about 1450.

Runjit Singh, *run jeet′sing′h′*, (1780–1839), maharaja of the Punjab and founder of the Sikh kingdom. His father, a Sikh chieftain, died in 1792, and the government fell into the hands of his mother. At the age of seventeen, however, Runjit rebelled against his mother's authority and assumed the power himself. The shah of Afghanistan granted him possession of Lahore, which had been taken from the Sikhs, and Runjit soon subdued the small Sikh states to the north of the Sutlej. The chiefs to the south of that river invoked the protection of the British, who made an arrangement with Runjit in 1809, accepting the Sutlej as the south boundary of his dominions. The ambitious prince now organized his army after the European model, with the help of French and English officers, and steadily extended his power, assuming the title of raja in 1812. His boundaries continued to widen until, by 1819, he was ruler of the entire Punjab, with title of maharaja, or king of kings. In 1836 he suffered a heavy defeat from the Afghans, but he retained his power until his death.

Run′nimede, the meadow on the right bank of the Thames, now a race course, in Surrey, England, 4 miles below Windsor, where King John met the barons who compelled him to sign Magna Charta, June 15, 1215. The actual signing is said to have taken place on Magna Charta Island, opposite Runnimede. See MAGNA CHARTA.

Rupee′, the standard silver coin of British India, the sterling value of which, nominally about 50 cents, has, owing to the depreciation of silver, of late years varied between about 30 and 48 cents. A rupee equals 16 annas. Half-rupees, quarter-rupees and eighth-rupees are also coined in silver; 100,000 rupees are called a lac; 100 lacs, a crore.

Ru′pert, PRINCE (1619–1682), distinguished as a cavalry leader in the English civil war, the third son of Frederick V, elector palatine and king of Bohemia, by Elizabeth, daughter of James I of England. After some military experience on the continent, he went to England to assist his uncle, Charles I, and in 1642 he was made general of the horse. He distinguished himself at Worcester, Edgehill and Brentford, captured Birmingham in 1642 and Bristol in 1643 and displayed his courage at Marston Moor and Naseby in 1645, though his impetuosity and imprudence contributed to the disastrous results of these engagements. After the Restoration he was appointed lord high admiral and served with Monk against the Dutch. Much of his time in his latter years was devoted to scientific study, and he is credited with the invention of mezzotint engraving, which at least he introduced into England.

Rup′ture. See HERNIA.

Rush, a plant belonging to the family of sedges. It has long, tough, flexible stems, that are used in making mats and chair bottoms. There are a number of different species found in various parts of the world in swampy places. See HORSETAIL RUSH.

Rush, BENJAMIN (1745–1813), a famous American physician, born near Philadelphia. In 1766 he went to Edinburgh, and took his degree of M. D. there in 1768. He began to practice at Philadelphia in 1769, becoming at the same time lecturer in chemistry at the medical school of that city. He afterward filled the chair of the theory and practice of physics in the University of Pennsylvania. He early identified himself with the patriotic party, was one of the signers of the Declaration of Independence and in 1787 was a member of the convention of Pennsylvania for the adoption of the Federal Constitution. In 1774 he was one of the founders of the first anti-slavery society in America. Dr. Rush was a voluminous and versatile writer. His chief medical works are his *Medical Inquiries and Obser-*

vations, Diseases of the Mind and *Medical Tracts.*

Rusk, Jeremiah McClain (1830–1893), an American political leader, born in Ohio. He was reared on a farm, received a common school education and removed to Wisconsin in 1853. He took an active part in the Civil War and was brevetted brigadier general in 1865. He was elected to Congress in 1871 and served three consecutive terms. He was then elected governor of Wisconsin and occupied the position continuously from 1882 to 1889, when President Harrison appointed him secretary of agriculture. In this office he displayed notable ability and was zealous in behalf of the farmers of the country.

Rus′kin, John (1819–1900), an English art critic, author and social reformer, born in London. He studied at Christ Church, Oxford, gained the Newdigate prize for his poem on *Salsette and Elephanta* and graduated in 1842. In the year following his graduation appeared the first volume of *Modern Painters,* in which Ruskin maintained the superiority of modern landscape painters, especially Turner, over the old masters, and at the same time advocated a complete revolution in the accepted conventions of art and art criticism. The subsequent volumes, of which the fifth and last appeared in 1860, expanded the subject into a most comprehensive treatise, while similar criticism was extended to architecture in his *Seven Lamps of Architecture* and *Stones of Venice.* In 1851 Ruskin appeared as a defender of Pre-Raphaelitism, which had found inspiration in his works.

JOHN RUSKIN

In 1860, with the publication of *Unto this Last,* Ruskin appeared as a social reformer; and he engaged actively in the work which he championed in his writing. He improved the condition of several tenement houses, had streets cleaned and, in fact, devoted the greater part of his fortune to the improvement of the working classes. From 1871 to 1879 and from 1883 to 1884 he was Slade professor of art at Oxford, but was obliged to resign on account of ill health.

Besides the works already mentioned, Ruskin wrote, among others, *Fors Clavigera,* a series of letters to the workingmen of England; *Poems*; *King of the Golden River,* a fairy legend; *Sesame and Lilies*; *Ethics of the Dust*; *The Crown of Wild Olive*; *The Queen of the Air*; *Mornings in Florence,* and *Praeterita.* Eloquence, force and subtle analysis are the prevailing characteristics of Ruskin's literary style, and his works are permeated with a lofty enthusiasm for truth and beauty and with a generous sympathy for the poor and the weak.

Rus′sell, John, Lord, Earl Russell (1792–1878), an English statesman, the son of the duke of Bedford. Educated at a private school and at Edinburgh University, he entered Parliament in 1813, before attaining his majority. In 1819 he made his first motion in favor of parliamentary reform, the great question of which he was the champion through life. His influence in the Liberal party steadily increased, and though temporarily unseated in 1826, owing to his advocacy of Catholic emancipation, he carried a motion in 1828 against the Test Acts and thus led to their repeal. In 1831 he was paymaster-general in Lord Grey's administration, and though not in the cabinet, he introduced the first Reform Bill to the House of Commons. In the exciting struggle that followed, Lord Russell was popularly accepted as the great champion of reform. In Lord Melbourne's second cabinet, Russell was home secretary, and in 1839 he became a colonial secretary. From 1841 till 1845 he led the opposition against Peel (See Peel, Sir Robert), with whom, however, he was in sympathy on the Corn Law question; and when Peel resigned in 1846, Russell formed a ministry which remained in power until February, 1852. He reëntered office in December, 1852, as foreign secretary under Lord Aberdeen, and in 1855 he became colonial secretary in Lord Palmerston's cabinet. He represented Great Britain at the Vienna Conference, but he incurred by his negotiations so much unpopularity that he resigned office in July of the same year.

A period of rivalry between Russell and Palmerston now ensued, which, however, ended in 1859, when the former became foreign secretary under his old chief, through whom he was raised to the peerage in 1861. In 1865 Russell succeeded Palmerston in the leadership of the Liberal party, but when his new reform bill was rejected in 1866, the Liberals resigned. Thenceforward Earl Russell held no further office, though he warmly advocated all liberal measures.

Russell, John Scott (1808–1882), a Scotch engineer and naval architect, born near Glasgow. After graduating at Glasgow, at the age of sixteen, he became a science lecturer in Edinburgh, and in 1832 he temporarily filled the chair of natural philosophy at Edinburgh University. Next year he began his important researches into the nature of waves, which led to his discovery of the wave of translation, on which he founded the wave line system of naval construction, introduced into practice in 1835. He was manager of a large shipbuilding yard on the Clyde for several years, and later he established a yard of his own on the Thames. He was one of the earliest advocates of iron-clad men-of-war and was joint designer of the *Warrior*, the first English sea-going armored frigate; but the most important vessel he designed and constructed was the *Great Eastern*. One of his chief engineering works was the vast dome of the Vienna Exhibition of 1873, which had a clear span of 360 feet. He was the author of *The Modern System of Naval Architecture* and other writings.

Russell, Sol Smith (1848–1902), an American actor, born in Brunswick, Maine. As a drummer boy he was with the Federal army during the Civil War, and after the close of the war he began to play small parts in the theater at Cairo. At Saint Louis, in 1865, he achieved his first real success, and later in his own company and in such plays as *Edgewood Folks*, *Peaceful Valley*, *A Poor Relation* and *A Bachelor's Romance*, he became extremely popular.

Russell, William Clark (1844–), an American novelist, born of English parents at New York City. He went to sea at an early age, but abandoned his nautical career in 1865 and took to literature. Among his numerous popular sea stories may be mentioned *The Wreck of the Grosvenor*, *An Ocean Freelance*, *A Sailor's Sweetheart* and *The Romance of a Midshipman*.

Russell, William Eustis (1857–1896), an American lawyer and administrator, born in Cambridge, Mass. He graduated at Harvard and at the Boston University Law School and began practice in Boston. In 1885 he was chosen mayor of the city as a Democrat and was twice reëlected without opposition. After being twice defeated for governor, he was elected in 1890 and was reëlected in 1891 and 1892, largely by reason of his personal popularity. He was a prominent candidate for the Democratic nomination for president in 1896, but his name was set aside on account of his well-known convictions in favor of the gold standard.

Russia, *rush'a,* or **The Russian Empire,** next to Great Britain the largest empire in the world, extends from the Baltic Sea to Bering Strait and occupies the eastern part of Europe and all of the northern part of Asia. It is bounded on the n. by the Arctic Ocean, on the e. by the Pacific Ocean, on the s. by the Chinese Empire, Persia and Turkey and on the w. by Turkey, Bulgaria, Rumania, Austria-Hungary, Germany, the Baltic Sea, Sweden and Norway. Its greatest extent from east to west is about 7000 miles, and from north to south, 2175 miles. The area is 8,660,000 square miles. The Empire is generally divided into European Russia and Asiatic Russia. This article deals with European Russia, for the other divisions of the Empire are described under their respective titles. See Siberia; Turkestan. The following table includes the area and population of European Russia and the other large divisions of territory:

Province	Area in Square Miles	Population
European Russia	1,862,524	94,244,096
Poland	49,018	9,456,105
Ciscaucasia	85,201	3,745,998
Transcaucasia	95,402	5,608,775
Siberia	4,799,468	5,784,382
Steppes	710,905	2,472,931
Turkestan	400,770	4,896,822
Trans-Caspian Province	213,855	377,416
Finland	125,784	2,592,864
Internal waters—Seas of Azov, Caspian, Lake Aral, etc.	317,468	
Total	8,660,395	129,179,389

Surface and Drainage. European Russia occupies more than one-half of the continent of Europe. It has, including internal waters, an area of about 2,095,000 sq. mi., or two-thirds that of the United States. It extends from the Arctic Ocean to the Black and Caspian seas, and from the Ural Mountains to the Baltic Sea, Germany and Austria. The country is a vast plain, which is divided into northern and southern slopes by a height of land, which passes in an irregular direction from a little north of the middle point in the Ural Mountains to the point on the Baltic where the boundaries between Russia and Germany unite. This height of land attains its greatest elevation in the Valdai Hills, directly south of Saint Petersburg. These have an elevation of a little over 1000 feet. On the south are the Caucasus Mountains, which have an elevation of over 18,000 feet, and to the west of these is a range of low mountains in the Crimea, which attains an altitude of about 4000 feet, while in the northern part of the eastern boundary are the Urals, reaching at the northern extremity an altitude of about 7000 feet, though having an average height of from 4000 to 5000 feet.

Russia has a number of large and important rivers. To the north of the watershed and flowing into the Arctic Ocean or its coast waters are the Petchora, draining the northeastern part of the country; the Mezen; the Dvina, flowing into the Gulf of Archangel, and the Onega, flowing into the Gulf of Onega; while those flowing into the Baltic or its coast waters are the Neva, the Düna, the Niemen and the Vistula, which in the lower part of its course flows through Prussia. Of the great rivers flowing southward we find the Ural, the Great Uzen, the Volga and the Cuma, flowing into the Caspian; the Don, flowing into the Sea of Azov, and the Dnieper, the Bug and the Dniester, flowing into the Black Sea. All of these streams are navigable in the lower parts of their courses, and some of them are navigable for many miles. Russia has a number of large lakes, nearly all of which are situated in the northwestern part of the country. The largest of these, Lake Ladoga, north of Saint Petersburg, is about the size of Lake Ontario and is the largest lake on the continent of Europe. To the northwest of this, in Finland, are other large lakes, all of which are in a low country and have marshy borders. The Caspian Sea, with its surface 80 feet below the Mediterranean and entirely enclosed by land, is really a salt lake, and the Black Sea might also be considered in the same light.

Climate. Russia extends through nearly 35 degrees of latitude; consequently it has a varied climate, the extreme northern part being within the Arctic regions and the southern part falling within the warm temperate regions. The absence of mountain barriers causes the country to be swept alternately by winds from the north and the south; therefore it is subject to sudden and violent changes in temperature. The western portion also has a more equable climate than the eastern, because it is much nearer the sea. The mean temperature at Saint Petersburg for January is about 15°, and for July it is about 64°, while at Odessa it is much warmer. The average rainfall for the entire country is about 20 inches a year, but it is much greater in the northwestern than in the southeastern portions. The entire country in winter is usually covered with a heavy fall of snow, and this adds much to the moisture and is of great advantage to agriculture.

Mineral Resources. Russia has an abundant supply of minerals, the most valuable being platinum, iron, copper, coal, salt, zinc, gold and silver. Coal is found in large quantities in Poland and in the south central part of the country, in the valley of the Donetz River. Other coal measures are also known, but those named are the only ones that have been extensively worked. Iron is found near the coal in Poland, and it also occurs in the Ural Mountains, which are the depository of nearly all the other metals. Salt is found in Poland, where it has been mined for many years, and is obtained in large quantities. In Caucasia are the most productive petroleum fields known to the world. Copper is found in Poland and Finland. Malachite, emeralds, diamonds and other precious stones occur in the Ural Mountains, and amber is found in the coasts of the Baltic. Building stone is not plentiful, but porcelain clay and clay suitable for brick and tile are found in a number of places. The lowlands along the Baltic contain extensive peat bogs. There are others, also, near Moscow, and these are an important source of fuel.

Agriculture. Over one-third of the area of the land is covered with forests. These occupy a belt stretching across the country immediately south of the frozen tundra in the north. The trees consist of pine, larch and other evergreens, with a few hard woods. South of this and extending across the central part of Russia and southward along the western border to the Baltic Sea is a great area of black fertile soil, embracing over 225,000,000 acres. About three-fifths of this is under cultivation. The chief crops are rye, oats, wheat, barley, potatoes and sugar beets. The great wheat belt is in the southwestern part of the country, while the more hardy cereals are raised farther north. Rye, which is the greatest food plant of the country, is raised universally; hemp and flax are also quite extensively raised. In the southern part of the country, along the Black Sea, apples, plums, grapes, apricots and other fruits are successfully grown, and this region has become noted for its wines. Cattle, horses, sheep, goats and swine are raised throughout the country, and in the more favorable localities in the south dairying has become an important branch of agriculture; but live stock is not generally exported.

MANUFACTURES. In the last half-century Russia has developed rapidly as a manufacturing nation. As such she occupies an intermediate position between the less civilized nations of the East and the more civilized nations in western Europe. Her large population creates a great demand, which, as yet, her manufacturers have been unable to supply, though the increase in the number of products and the output of each is noticeable from year to year. Among the most important manufactured products are iron and steel, cotton goods, flour and grist mill products, machinery, beet sugar, spirituous and malt liquors, leather and articles of food. The country contains but few large factories, and most of the manufacturing is done in the homes of the workmen or in small shops. The greater part of the workmen engage in farming during the summer season. Saint Petersburg, Moscow, Warsaw and Lodz are the most important manufacturing cities.

OTHER INDUSTRIES. In the forest region lumbering and the manufacture of potash, tar, turpentine and other forest products engage a large number of inhabitants. The fisheries of the country are also very important. Notwithstanding its numerous lakes and rivers, all of which are well stocked with fish, the country is unable to supply the local demand. The inhabitants of the extreme north are engaged to a large extent in hunting and trapping and derive considerable revenue from the sale of furs and the feathers and down of water fowl.

TRANSPORTATION. Russia has comparatively little seacoast and few important ports, but the vast plain occupying most of the country makes it possible for boats to navigate nearly all of the streams, most of which have been canalized. In addition to these, there are many miles of canals connecting the different river systems, so that it is possible for boats to pass from the White Sea to the Caspian Sea and the Black Sea and from the Caspian Sea to the Baltic Sea. Russia has a larger canal mileage than any other country in the world, and in addition to this she has over 30,000 miles of railways, which radiate from Saint Petersburg and Moscow to all parts of the Empire. Carriage roads are generally poor, and railways, rivers and canals are relied upon for the main transportation of passengers and freight. Telegraph lines connect all of the important towns, and a fairly good postal system is maintained.

Russia has an extensive commerce, carried on chiefly with Great Britain and Germany. The United States also has an important share. The exports consist almost wholly of wheat, flour and leather, while the imports are raw material for manufactures, particularly cotton; manufactured goods, including clothing, machinery and scientific instruments, and food stuffs. While within recent years Russia has doubled her foreign trade, her commercial development has not been as marked as has her increase in manufactures. This movement is very significant, as it is making the country far more independent and is leading to the development of the laboring classes. Because of the peculiar commercial situation in the country, it still retains its ancient custom of transacting much of its trade through fairs, which are annually held at a number of centers, the most important being at Nizhni-Novgorod. See NIZHNI-NOVGOROD.

INHABITANTS AND LANGUAGE. European Russia contains a greater number of nationalities and races than any other country on that continent. However, by far the larger part of the inhabitants are Slavs and are generally known as Russians. These are divisible into the Great Russians, who inhabit the central portion of the country; the Little Russians, located in the southwest and including the Cossacks and the White Russians, found in the western provinces. The Poles, inhabiting Poland, are also of Slavonic descent. In the southeast are found Servians and Bulgarians, also some descendants of the Turks and Tartars, comprising Khirgis and the Tartars of Kazan.

The Kalmucks found in this locality are of Mongolian descent, and in the northwest are the Finns, the Samoyedes and some Laplanders, also of Mongolian descent. In addition to these races there are some Lithuanians and Lapps, several million Jews and natives of other European countries. Of these last nationalities, the Germans are the most numerous.

Class distinction is very prominent throughout the country. The nobility fill all of the highest positions in the government and the army and have the highest place in the social scale. They are granted numerous special privileges, such as freedom from poll tax, and they form in each province a body which is governed as distinct from the other classes. The clergy and other religious functionaries also form a class by themselves, nearly as distinct as the nobility. Following these classes are the persons who engage in the practice of law and other professions. Next below the professional men are the merchants, and last, but comprising over four-fifths of the population, are the burghers and peasants, who constitute the lowest class. The condition of these people is often wretched in the extreme. Most of them engage in tilling the soil, but scarcely any own the land they cultivate. They live in communities which are called *Mirs* and cultivate the land together, though each family has the right to what is grown on the patch of land that it tills. This system is detrimental to any progress in agriculture, and primitive implements and the poorest of methods usually characterize all agricultural occupations, except on the large estates in the wheat region, where American implements and farm machinery have been introduced to some extent. The country is very unevenly populated, the central and southern portions containing by far the largest number of inhabitants. The northern half is sparsely settled, some regions having less than one person to the square mile.

Notwithstanding all these diversities of races and conditions, the Russian language and Russian methods and institutions dominate the entire country and its inhabitants. Various dialects and tongues are found in different parts, but they have merely a local significance, and the Russian is the official language of the Empire.

EDUCATION. Education is in a much more backward condition than in the other large European countries. The efforts of the government have been almost entirely confined to educating the nobility and the official classes. These are so numerous as to tax to the utmost the revenues and energies of the government, so that it has been unable to do very much for the peasantry; hence, while numerous universities and technical schools are scattered throughout Russia, and while the nobility and professional classes are well educated, there is among the people as a whole a much larger percentage of illiteracy than in other European countries. Previous to the enfranchisement of the serfs, in 1861, no attempt had been made to educate the lower classes. The country is now divided into fifteen educational districts, and systematic effort is made to establish common schools; yet only a small proportion of the children attend these schools, and educational progress among the peasants is slow.

GOVERNMENT AND RELIGION. The government of Russia is an absolute monarchy, with the supreme authority vested in the emperor, who has the title of czar. The office is hereditary in the male line of descent, passing to the oldest son, but in case there are no sons in the family, it may pass to a daughter of the ruling czar. Although there is no constitution, the czar is governed in his administration by certain well-established rules and customs. He is assisted by a number of councils, whose members are selected from among the nobility or the officers of the army. Chief of these is the Council of the Empire, which consists of one member from each of the zemstvos; six from the Holy Synod, the governing body of the Russian Church; six from the universities; six from the chambers of commerce and industry; eighteen from the nobility, and six from the landed proprietors of Poland. Half of the members of this assembly are elected, and half are appointed by the czar. This council is divided into four departments. One has control of legislation; another, of civil and ecclesiastical affairs; another, of finance and commerce, and the fourth, of industry and science. Through the departments of this council, all legislation is prepared and the financial measures of the government are devised. Each department has its own organization, and for the transaction of ordinary business the departments sit separately. The Senate is practically the department of justice. It is divided into six sections, and the members of each are appointed by the emperor. One section acts as a court of cassation, another looks after the publication and execution of laws, another is concerned with the collection of taxes and the disbursement of public funds, and another has charge of the maintenance of order. The Holy Synod has general supervision of the affairs of the Church and is composed almost entirely of Church officials. The council of ministers consists of 13 members, appointed by the emperor, and has charge of the administration of the departments of the government, such as foreign affairs, education and police service. Poland and Finland are governed by special provisions, and each has a lieutenant governor appointed by the czar. For local administration the Empire is divided into governments and provinces, and each of these is subdivided into districts, and each district is subdivided into communes. The districts have an assembly called the zemstvo, the members of which are elected. They also have a civil government. The communes are governed by local officers, who are elected by the inhabitants at a meeting somewhat resembling the old New England town meeting. A popular legislative assembly was chosen in 1906 (See DUMA).

The orthodox Greek Church (See GREEK CHURCH) is the State Church of Russia, and the czar and all the members of the royal family are required to belong to it. This faith is professed by more than four-fifths of the inhabitants of European Russia. Other religions not detrimental to morality are tolerated. There are about 11,000,000 Roman Catholics, 13,000,000 Mohammedans and 5,000,000 Jews; representatives of the various Protestant denominations are also found throughout the Empire.

ARMY. See ARMY, subhead *Russian Army.*

NAVY. See NAVY, subhead *Other Nations.*

LITERATURE. The oldest writings in the history of Russian literature are translations from the Old Church Slavic language of religious works, parts of the Bible and rituals for Church service. The most important of the earliest writers was Nestor, who lived early in the twelfth century, and who wrote a celebrated *Chronicle,* which is not extant. From the time of the destructive invasion of the Mongols, in the thirteenth century, until the seventeenth century, life in Russia was on a low plain intellectually, but under Peter the Great literature began to revive. Not only did the new literature show forth the national spirit, but it began to have a distinctly European character. Throughout the eighteenth century the growth continued, and to one man of that century, more than to any other person, belongs the credit for fixing the literary form of the language. This was Lomonosoff (1711–1765), whose most important works were his writings on versification and rhetoric. During the reign of Catharine II, French influence was paramount, but this was superseded about the end of the eighteenth century by English and German influence, and the sentimentalism then in vogue in those two countries made great headway in Russia.

Nineteenth century Russia is represented in literature by many writers of importance, the greatest of whom are Alexander Pushkin (1799–1837), one of the greatest of Russian poets; Gogol (See GOGOL, NIKOLAI VASSILYEVITCH); Turgenieff (See TURGENIEFF, IVAN SERGEYEVITCH), and Tolstoy (See TOLSTOY, LYOFF NIKOLAYEVITCH, Count).

ART. See PAINTING.

CITIES. The chief cities are Saint Petersburg, the capital; Moscow, Warsaw, Odessa, Lodz, Riga, Kiev, Kharkov, Vilna, Saratov, Kazan, Astrakhan and Nizhni-Novgorod, each of which is described under its title.

HISTORY. In the ninth century Russia was inhabited by numerous tribes of Slavs, who had come, how long before is not known, from the neighborhood of the Carpathian Mountains. The total lack of union among the tribes made the Slavs an easy prey to invaders, who swept in upon them from all sides. Finally, about the middle of the ninth century, the Scandinavians, under their leader, Rurik, were invited by the Slavs to enter the country, assume rule over it and protect it from invasion. Rurik's power grew rapidly, and by 862, the date usually given as the foundation of the Russian Empire, he ruled from Novgorod a wide empire. Rurik died in 879, and Oleg, a member of his family, was made regent for Rurik's son. Under Oleg the capital of the country was removed to Kiev, and an attack was directed against Constantinople so successfully that the Byzantine emperor was obliged to pay a ransom for the city.

Gradually the descendants of Rurik strengthened and widened their kingdom, which came in time to be called Russia, probably from the name given by the Finns to the Scandinavians. Under Vladimir the Great (980–1015) the Greek form of Christianity was introduced into the country, and an effort was made to better the religious and intellectual condition of the people. By the end of the eleventh century the Russians had reached a plane of civilization little lower than that of the peoples of western Europe.

In the first half of the thirteenth century, however, the Mongols swept over Russia, and this invasion put an end to all self-government, to all intellectual progress, in fact, to all civilization. The country was cut off from western Europe, and the nationalization of the Slavs was delayed for centuries. Gradually Moscow became the strongest of the principalities of eastern Russia, and it was a grand prince of Moscow, Dmitri IV, who in 1380, by his victory over the Mongols, took the first step in the liberation of the country from the foreign yoke. As the principalities came to recognize that, disunited, they could never hope to become free, they laid aside their dissensions and joined for the overthrow of the Tartars. Ivan the Great (1462–1505) succeeded in breaking the power of the Mongols by turning the different hordes against each other, and Ivan the Terrible (1533–1584) extended Russian rule over Kazan, Astrakhan and part of Siberia (See Ivan IV).

Following the strong rule of Ivan the Terrible came a period of anarchy and disorder, which ended with the election, in 1613, of Michael Romanoff to the throne. During the reign of Alexis, the son of Michael, considerable territory was acquired in a war with Poland, and a protectorate was assumed over the Polish Cossacks. Alexis left three sons, of whom the eldest, Feodor, ruled but six years, expressing at his death the wish that his half-brother, Peter, should succeed him, rather than Ivan, the rightful heir, who was almost an imbecile. However, Peter's sister, Sophia, ambitious of power, succeeded in having Ivan proclaimed joint sovereign with Peter, intending to retain the power in her own hands. In the struggle which followed, Peter proved the stronger, Sophia was forced to retire to a convent and Peter became in reality the sole ruler of Russia, although Ivan was allowed to retain the title of czar. It is from the reign of this sovereign that the real greatness of Russia dates. (For the history of the country under Peter, see Peter I.)

At the death of Peter (1725) the crown passed to his wife, Catharine, who was succeeded two years later by Peter's grandson, Peter II (1727–1730). The reigns of Peter, Anna Ivanovna (1730–1740) and Ivan (1740–1741) were of no great importance in the history of the country, but during the reign of Elizabeth Petrovna (1741–1762) occurred the Seven Years' War between Austria and Prussia, in which Russia took part on the side of Austria. Peter, the successor of Elizabeth, was murdered within a short time of his accession, and his wife came to the throne as Catharine II (See Catharine II). Under Catharine Russia assumed a more prominent position among the European nations than ever before, and the genius of the queen enabled the country to support its position well. The partitions of Poland, by which Russia gained great accessions of territory, took place during Catharine's reign (See Poland), and the Crimea was annexed in 1783. A war with the Turks (1787–1792), in which Russia was successful, advanced the boundaries of Russia to the Dniester.

Paul I, the son of Catharine, succeeded her on the throne and ruled from 1796 to 1801. At the outset of his reign, he seemed favorable to reform, but he speedily changed his policy and enacted repressive measures that were so galling as to be almost unendurable. Finally he was assassinated, and his son, Alexander I, came to the throne. Alexander seemed fitted both by nature and by training for his position. He was a man of high ideals and of courage enough to carry them out. Among his first acts were the freeing of the serfs in the Baltic districts, the abolishing of the system of paid espionage and the discontinuance of torture as a legal punishment. (For his part in the Napoleonic struggle, see Alexander I.)

On the death of Alexander, in 1825, his brother, Nicholas I, came to the throne. Like Alexander, Nicholas began his rule in a liberal manner, but fell back later upon a policy of repression, overcome by the difficulties which met the reformer. His foreign relations led to war with Persia, participation in the struggle with Turkey, which ended in the Turkish defeat at Navarino, and finally to the great struggle known as the Crimean War (See Crimean War), before the close of which Nicholas died. His successor, Alexander II, was forced to accept the Treaty of Paris, which took from Russia a part of Bessarabia and her protectorate over the Danubian principalities. Another war with Turkey, begun in 1877, resulted much more favorably for Russia, but she was obliged by the other powers to give up a part of her gains (See Russo-Turkish War; Berlin, Congress of).

At the outset of his reign, Alexander began a series of radical reforms (See Alexander II), but before his death he had adopted the old reactionary policy and had become very unpopular. He was assassinated in 1881, and his son, Alexander III, came to the throne (See Alexander III). One of the most lasting in its results of any of the events of the reign of Alexander III was the agitation against the Jews. Many privileges were taken from them by law, and persecutions of all sorts were begun against them. With varying severity, this persecution has continued to the present day. On the death of Alexander III, in 1894, his son came to the throne as Nicholas II. He made few changes in his father's policy, continuing especially the attempt to advance Russian interests in the East. Railways were constructed in Asiatic Russia, and trading posts were everywhere established. In 1895, at the close of the war between China and Japan, Russia came into possession of the Chinese peninsula of Liao-tung, on which Port Arthur is situated (See CHINESE EMPIRE, subhead *History*). This port was of the utmost importance to Russia, as affording an ice-free outlet for her Siberian commodities. Constant efforts were made to make the district about Port Arthur thoroughly Russian in language and in commerce, Korea was seized on some pretext and the annexation of Mongolia was attempted. No opportunity was overlooked for sending Russian soldiers into Chinese territory, and by the close of the Boxer trouble in China, Manchuria and half of Mongolia were firmly held by Russia. Backed by the European powers, Japan protested against the aggressions of Russia and brought such pressure to bear that the evacuation of the territory by October, 1903, was promised by Russia. Later it became evident that the czar was still hoping to annex the territory which he held, and Japan, fearing for Korea, of which she considered herself the natural guardian, saw that she would be obliged to drive Russia from Chinese territory. On February 6, 1904, the Japanese representative left Saint Petersburg, and two days later active hostilities began. For the military events of the war, see RUSSO-JAPANESE WAR.

The complete defeat of Russia in this struggle had some beneficial effects on the country. It aroused the people to a sense of the inefficiency of their government and showed them the corruption which existed in the official life of the country. This awakening had begun, however, long before the close of the struggle. Throughout the war Nicholas II had showed himself utterly unable, by reason of his vacillating disposition, to deal with the grave situation which confronted him. The reactionary class, which was completely in control, prevented the spread of education among the poorer classes; reduced the peasants to the condition of mere slaves; forced them to give up most of their earnings in taxes to support the favored classes—in short, brought the country to a condition little different from that of France previous to the Revolution The damage done to Russian trade by the war with Japan threw hundreds of thousands of laborers out of work, race wars broke out among the different peoples within the country, and everywhere demands for freedom were made. The czar seemed at first ready to grant concessions, but the reactionary party was too strong, and the petitions for representative government were refused. The spirit of revolt spread; peasant risings occurred; the national troops, in their attempts to quell the disturbances, were resisted by armed forces, and the crew of the warship *Potemkin* mutinied and cruised from one Black Sea port to another. At length the czar found himself compelled to grant certain reforms and, most important of all, to promise the assembling of a representative legislative body. Mere promises of reform, however, were looked upon with suspicion by the revolutionist party, who were to be satisfied with nothing less radical than the proclamation of a democratic republic, and violent outbreaks constantly occurred in different parts of the country.

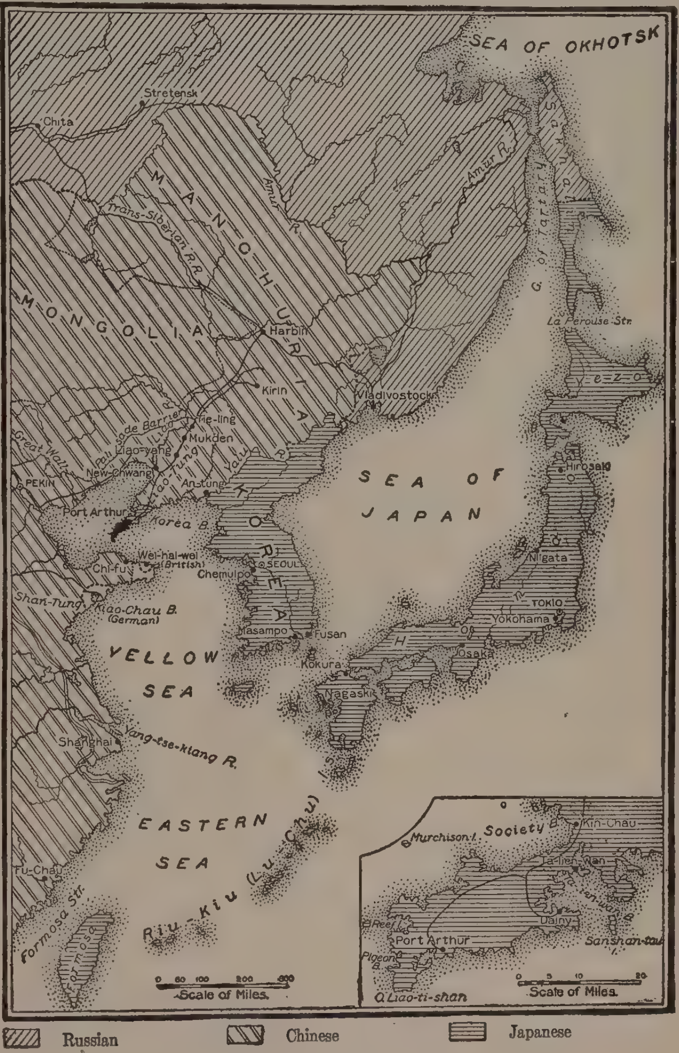
The promised legislative body, the Duma, held its first session on May 10, 1906. After ten weeks of free discussion of conditions in Russia, during which important demands were made upon the czar, amounting in substance to the relinquishment of his autocratic power and the granting of real administrative control to the people, the czar dissolved the Duma, July 21. At the same time he ordained another election, to be held seven months later. Most of the members of the Duma fled to Finland and continued to hold sessions until finally dispersed by government soldiers. A second Duma, elected on a greatly restricted franchise, assembled March 1, 1907, and was dissolved by the edict of the czar on June 17. The measures passed were of little importance. See DUMA; WITTE, SERGEI YULIEVITCH; NICHOLAS II. Consult Morfil's *Russia* and Palmer's *Russian Life in Town and Country*.

Russian Thistle, also called *Russian saltwort* and *Russian tumbleweed*, found west of the Mississippi as far as Colorado. The flowers are small and purplish in color. The seeds are easily scattered by the wind, taking root in all sorts of soil in every locality.

Rus'so-Japanese' War, the struggle between Russia and Japan, which continued from early in 1904 to the summer of 1905. For the causes, see the article RUSSIA, subhead *History*.

From the close of the war with China, Japan had foreseen that, sooner or later, a war with Russia must come, and she had prepared for it. Realizing the impossibility of equaling in numerical strength the Russian forces, the Japanese had attempted to make up for the deficiency by having every department of their army and navy in perfect condition. The Russians, on the other hand, confident of success over the smaller nation, did not take the trouble to root out all the corruption which underlay their military and political organization.

From the first, the capture of Port Arthur was the chief objective point of the Japanese, and it was by an attack on that fort that Togo, vice admiral of the Japanese navy, opened hostilities on Feb. 8, 1904. The Russian vessels, which had been assembled there to sustain the attack, suffered great damage, and the Russians withdrew to the land forts. Port Arthur was blockaded, and the Japanese began at once to meet with successes on land. From a strong position which he had occupied on the Yalu River, Kuropatkin, the Russian general, was dislodged, and he retreated toward Mukden, drawing the Japanese, under Kuroki, after him. Fifty miles south of Mukden, Kuropatkin again took up a position, from which, however, he was again forced to retreat. In October he suddenly changed his tactics and made an attack on Oyama, the leader of the combined Japanese forces. The five days of stubborn fighting which took place along the Sha-ho showed in the end the superiority of the Japanese, and the Russians were compelled to retreat to Mukden.



THE RUSSO-JAPANESE WAR
Showing battles and rearrangement of boundaries.

Meanwhile, Port Arthur, which was cut off from the possibility of relief from the land side by the first successes of the Japanese, was closed to ships by merchant vessels sunk in the roadstead. The original plan was to take the place by storm, and this succeeded in August, 1904, so far as the outposts were concerned. Once intrenched behind their permanent defenses, however, the Russians had an apparently impregnable position, and after an attempted storming, which lasted for seven days and cost the Japanese about 25,000 men, Nogi, the Japanese general, began engineering operations. By a series of zigzag trenches, the Japanese advanced upon the city, a steady fire being kept up, meanwhile, from their batteries hidden behind the hills, and one by one the defenses of the city fell. Stoessel, the Russian general, finally surrendered on January 2, 1905.

From October, 1904, when the Russians retreated to Mukden, to the following February, there were no important land operations. On February 20, however, a Japanese advance began, which lasted until March 15. This series of engagements, known as the Battle of Mukden, was the greatest land action of modern history, the combatants numbering about 700,000, and the battle front extending for over eighty miles. At length, owing to the arrival of Nogi, the Japanese were victorious. The only other great battle of the war was the Battle of the Sea of Japan, which took place during the days and nights of May 27 and 28. The forces were apparently equal, but the Japanese, under Togo, completely defeated and destroyed the Russian fleet

In June, 1905, President Roosevelt, voicing the sentiment of almost all nations, suggested to the combatants the advisability of ending the struggle, and in August of that year the peace convention met at Portsmouth, New Hampshire. The treaty, which was signed on September 5, gave Port Arthur to Japan, made her supreme in Korea, allowed her important railway privileges in Manchuria and ceded to her the southern half of Sakhalin island.

Russo-Turkish War, a war between Russia and Turkey in 1877–1878. The Russian ambition to gain a foothold in the Balkan Peninsula, with the ultimate object of gaining possession of Constantinople, was the real cause of the war, but the immediate occasion was the Turkish treatment of Christian subjects. Russia and the other European powers had joined in demanding a reform in the Turkish government of the Christian provinces, but they disagreed as to the exact nature of the reforms desired and were unable, therefore, to bring effective pressure to bear upon Turkey. The massacres in Bulgaria in 1876 brought matters to a crisis, and Russia declared herself the protector of the Christians in the Balkan and began war in 1877. Contrary to the general expectation, the Russians did not gain an easy victory. By January, 1878, however, they had clearly shown Turkey the futility of holding out longer, and peace was made. The treaty of San Stefano gave Russia more power than the other European powers felt was safe, and the Congress of Berlin was accordingly assembled to readjust matters. See Berlin, Congress of.

Rust, a name given to the oxide of iron, which is formed wherever iron is exposed to moisture. The process of oxidation takes place without any apparent heat, but it is known by chemists that the amount of heat is the same as that evolved when the iron burns in oxygen.

Rusts, minute fungi, that attack the leaves and stems of plants and produce a serious disease. It is called rust, because of the peculiar color of the spores. Rust may be said to begin with little black dots and lines that appear on the surface of the stem late in summer. These lines are the innumerable spores which constitute the form in which the plant survives the winter, or its rest period. In spring each spore begins to grow, but after a little, it will die, unless in some way it is carried to the barberry bush. Upon the leaves of that shrub the growing spores thrive lustily, and soon they grow to be long chains of little fringed cups, on the lower side of the leaves. These cups produce a different kind of spores, which are carried by the wind, or in some other way, to wheat or grass or some cereal, where they force their way into the pores of the leaves and mature the blight spores that spoil the fruit. Toward fall they again go into the resting form. Three distinct stages are thus seen in the life of the rust, as is the case with most of the fungi.

Ruth, Book of, a book of the Old Testament. It is a kind of appendix to the book of *Judges* and an introduction to those of *Samuel*, and it is therefore properly placed between them. The story of Ruth records in simple language the ancient rights of kindred, redemption and other interesting customs of Hebrew antiquity. The date of the history and the name of its writer are unknown, but it is probably of a date subsequent to the captivity.

Ruthe′nians (sometimes called *Russinians*, *Russniaks*, *Red Russians* or *Little Russians*), numerous Slavonic tribes inhabiting Galicia and Hungary. The number of Ruthenians in the Austro-Hungarian Empire amounts to 3,500,000, of whom about 500,000 are settled in Hungary. They live almost exclusively by agriculture, and their civilization is not advanced. They belong for the most part to the United Greek Church, and they often prove troublesome to the government on account of their Russian sympathies.

Ru′therford, N. J., a borough of Bergen co., between the Passaic and the Hackensack rivers, on the Erie railroad, 7 mi. s. s. e. of Paterson and 9 mi. n. w. of Jersey City. It is a popular residence place for New York business men. Lithographic supplies, mirrors and boilers are manufactured. Population in 1905, 5218.

Rutile, *ru′til,* red oxide of titanium, a brown, red, yellow, and sometimes nearly velvet-black, ore. It is found in many European countries and in North America, chiefly in the veins of primitive rocks. It is infusible before the blowpipe without a flux. It sometimes occurs in fine threads, extending through transparent quartz crystals, and forming beautiful specimens.

Rut′land, Vt., the county-seat of Rutland co., 56 mi. s. w. of Montpelier, on the Otter Creek and on the Rutland and the Delaware & Hudson railroads. The city is situated near lofty and picturesque peaks of the Green Mountains and in a region containing very extensive deposits of marble. Iron ore, fire clay and slate are also found, and the city has large scale works, lumber mills, machine shops, boiler and engine works and other factories. The prominent buildings include the Memorial Hall, the courthouse, the Federal building, the public and the Baxter libraries, the House of Correction, the opera house and several bank buildings. The place was settled about 1770. From 1784 to 1804 Rutland was one of the state capitals, and the state house, constructed in 1784, is the second oldest building in the state. During the Revolution two forts were erected here. The city was chartered in 1892. Population in 1900, 11,499.

Rut′ledge, Edward (1749–1800), an American patriot and statesman, born at Charleston, S. C. He became famous as a lawyer and performed important service in behalf of the colonial cause, being one of the signers of the Declaration of Independence. He was later United States senator and governor of his state.

Rutledge, John (1739–1800), an American statesman and jurist, born at Charleston, S. C. He was a brother of Edward Rutledge and was a distinguished lawyer. He labored earnestly for the cause of the colonies, both in his native state and in Congress, and was first governor of the new State of South Carolina. In the Federal constitutional convention he was a warm supporter of the Constitution and was appointed one of the first justices of the United States Supreme Court, resigning to become chief justice of the supreme court of South Carolina. In 1795 Washington appointed him chief justice of the United States Supreme Court, but Rutledge's mind gave way, and the appointment was not confirmed.

Ruysdaal or **Ruisdael,** *roys′dale,* Jacob van (1625–1682), one of the most distinguished Dutch landscape painters, born at Haarlem. Fine examples of his works are to be seen in the National Gallery at London and in the Louvre at Paris. Landscapes with dark clouds hanging over them, lakes and rivulets surrounded by overhanging trees and various aspects of nature are his subjects and are represented with true poetic feeling and admirable technique. Among fine examples of his work are *Oak Forest, Ford in a Wood, The Hunt, Storm at Sea* and *The Waterfall.*

Ruyter, *roi′tur,* Michael Adriaanszoon de (1607–1676), a celebrated Dutch admiral. He rose to his rank from the position of cabin boy and had distinguished himself for remarkable seamanship and bravery in battles against the Spaniards and the Barbary pirates before the outbreak of the war with England in 1652. In this war he won some engagements himself, and was with Tromp when he defeated Blake. When war again arose with England in 1666, he was given the chief command, and while not always successful, he made the English pay well for their victories. He fought against the English and French in 1672 and against the French in 1675.

Ry′an, Patrick John (1831–), a Roman Catholic archbishop, born near Thurles, Ireland. He was ordained deacon in 1853, completing his

PATRICK JOHN RYAN

studies in Saint Louis, Mo., was raised to the priesthood in 1854, and was elected coadjutor archbishop of Saint Louis in 1872. His administration was energetic and successful. He was nominated archbishop of Philadelphia in 1884. He is distinguished as a graceful and eloquent speaker.

Rye, a grain closely related to wheat and barley. For centuries rye has been one of the most important food plants. It is supposed to be a native of western Asia, but it has been cultivated in Europe from time immemorial. Rye thrives in climates and in soils which forbid wheat, requires less manure and ripens faster. It is extensively grown in northern Europe, and rye bread forms an important article of food for the laboring classes of many parts of Russia, Sweden, Norway, Denmark, Holland and Prussia. Unmalted rye meal, mixed with barley malt and fermented, forms the wash whence is distilled the spirit known as Holland gin (See GIN). The straw is long and flexible, does not rot easily and is used by brickmakers and thatchers, also for stuffing horse collars and mattresses and for making baskets, straw hats and bonnets. Rye is subject to a disease called ergot, which renders it dangerous for food. See ERGOT; GRAINS, *color plate*, Fig. 7.

Rye House Plot, in English history, a conspiracy planned in 1683, the immediate object of which was to assassinate Charles II and his brother, the duke of York (afterward James II), as they returned from the Newmarket races. This plan was to have been executed on the road to London, near a farm called Rye House; but it was frustrated by the fact that the king and his brother returned from Newmarket earlier than was expected. The detection of the plot led to the arrest on a charge of high treason of lords William Russell, Essex and Algernon Sidney, who were in no way connected with it. Essex put an end to his own life in the Tower, while Russell and Sidney were beheaded.

Ryswick, *riz'wik,* TREATY OF, a treaty negotiated between France and Great Britain on one side and Spain and Holland on the other, Sept. 20, 1697. This treaty ended the nine years' war between Louis XIV and the Grand Alliance and restored to the respective countries all conquests made in America and the East Indies during the war. The village of Ryswick is near The Hague. It contains only a few hundred inhabitants.

S

S, the nineteenth letter of the English alphabet. Its corresponding letter in the Phoenician alphabet had somewhat the form of a *w*, which in Greek was turned on edge, gradually becoming rounded into its present form. It has a twofold pronunciation—the sharp, or sibilant, character, as in *sack, sin, this, thus*; and the soft, or sonant, *z* sound, as in *muse, flies*. In certain words, as *fissure, sugar, passion,* it has the sound of *sh.*

Sab′bath (Hebrew, "rest"), the day appointed by the Mosaic law for a total cessation from labor and for the service of God, in memory of the circumstance that God, having created the world in six days, rested on the seventh. Sabbath is not strictly synonymous with Sunday, as the latter is the mere name of the day, while Sabbath is the name of the institution. Sunday is the Sabbath of Christians; Saturday is the Sabbath of the Jews and some minor Christian sects. On the Sabbath the Jews were not allowed to go out of the city farther than "a Sabbath-day's journey," 2,000 cubits, that is, about a mile. And as every seventh day was a day of rest to the people, so was every seventh year to the land, when it was unlawful to plow or sow or prune vines; and if the earth brought forth anything of its own accord, these spontaneous fruits did not belong to the master of the ground, but were common to all. This year was called the *Sabbatical year* and was also a year of release for Jewish debtors. The desire of distinguishing the Christian from the Jewish observance early gave rise to the celebration of Sunday, the first day of the week, instead of the Sabbath. In 366 the Council of Laodicea removed all scruples as to the duty of Christians to keep the Jewish Sabbath.

RUSSIAN SABLE

Sabine, *sa′been,* **River,** a river rising in the northeastern part of Texas and flowing southeastward, then southward, until it enters the Gulf of Mexico. It is about 500 miles in length, and for about 300 miles it forms the boundary between Texas and Louisiana. It is navigable for small steamers for some distance.

Sa′bines, an ancient people, allied to the Latins, and an important nation before the foundation of Rome. Originally they were confined to the mountain districts to the northeast of Rome, but in 290 B. C. they became part of the Roman state. See ROME, HISTORY OF.

Sa′ble, a flesh-eating mammal, closely allied to the common marten. It lives chiefly in Siberia, where it is hunted for its lustrous fur, which is of the highest value. It is brown, with grayish-yellow on the throat and with small grayish-yellow spots scattered on the sides of the neck. The animal, which is about a foot and a half long, lives in snowy regions, where hunting is difficult and dangerous, and is taken in traps only after patient effort. The *Tartar sable* is a species of the weasel genus, found in northern Russia and Siberia, and the *pekan* of North America is sometimes known as the *Hudson Bay sable.* The skins of all these varieties are frequently dyed and made to imitate the true *Russian sable.* Sable hair is used in the manufacture of artists' pencils.

Sable Island, a low, treeless, sandy island in the North Atlantic, off the east coast of Nova Scotia, 110 mi. s. e. of Cape Canso. It is 25 miles long and 1 to 5 miles broad. It is a refuge for shipwrecked persons and has two lighthouses. Many shipwrecks have occurred on it.

Sac or **Sauk,** an Algonquian tribe of indians, whom the Iroquois drove west of Lake Michigan, where they joined forces with the Fox indians, who had been driven south by the Ojibwa. The combined tribe was fierce and warlike, and in their numerous contests with the whites they have been practically exterminated, the few remaining being among the indians most opposed to civilization. See BLACK HAWK.

Saccharin, *sak'ka rin,* an artificial substance prepared from coal tar, first introduced to commerce in 1887 by its discoverer, Dr. Constantin Fahlberg, of Salbke, Germany. Its sweetening properties are very powerful; one grain of saccharin is said to sweeten distinctly 70,000 grains of distilled water. In this respect it is five hundred times stronger than grape sugar. It is not a fermentable sugar and is already in common use in the treatment of certain diseases, such as diabetes, and in many cases in which the palate craves for sweets, but in which ordinary sugar cannot, without danger, be permitted. Saccharin is manufactured in large quantities in Germany and is extensively used in the manufacture of confectionery and cordials, in baking and in preserving fruit.

Sachs, *zahks,* HANS (1494–1576), the most distinguished meistersinger of Germany in the sixteenth century, born at Nuremberg. He learned the trade of a shoemaker, and after the usual *wanderjahre,* or period of traveling from place to place, he commenced business in his native city. He took lessons under one of the chief meistersingers of Nuremberg. and in his leisure hours he made verses himself. In this he soon surpassed all his contemporaries, producing 6000 poems, one-fourth of which are in print. Sachs succeeded in imparting to his hymns a spiritual feeling which considerably aided the spread of the Reformation.

Sack'etts Harbor, N. Y., a village in Jefferson co., on Black River Bay, Lake Ontario, 11 mi. w. of Watertown, and on the New York Central railroad. The principal features are the United States military post, Madison Barracks; the United States naval station, and a fine harbor. In the War of 1812 it was the scene of an attack by the British under Prevost against the American fort. The engagement was a victory for the Americans, who lost in killed and wounded about 135 men, while the British loss was nearly twice as great. Tompkins Park has been built on the scene of this battle.

Sack'ville, THOMAS, Baron Buckhurst and Earl of Dorset (1536–1608), an English statesman and poet. At Oxford and Cambridge he distinguished himself by his Latin and English poetry, and as a student of the Inner Temple he wrote, in conjunction with Thomas Norton, the tragedy of *Gorboduc,* or *Ferrex and Porrex,* the first example in English of regular tragedy in blank verse. He took a prominent and creditable part in some of the chief events of Elizabeth's reign. He was a member of the court which tried Mary Queen of Scots; he succeeded Lord Burleigh as lord high treasurer, and he presided at the trial of the earl of Essex.

Saco, *sah'ko,* a river that rises in New Hampshire and flows southward through the celebrated Crawford Notch, in the White Mountains, then easterly into Maine, after which it takes a southerly course to the ocean. It is about 160 miles long and has a fall of 72 feet at Hiram and another of 42 feet at Saco. The river is celebrated for the wildness of its scenery through the Notch.

Saco, MAINE, a city in York co., 15 mi. s. w. of Portland and 4 mi. from the ocean, on the Saco River, opposite Biddeford, and on the Boston & Maine railroad. The river furnishes good water power, and there are cotton mills, boot and shoe factories and manufactories of machinery, brick, belting and other articles. Old Orchard Beach, near the city, is a popular summer resort. The prominent buildings include the Thornton Academy, York Institute, two libraries, several fine churches and good business blocks. The first permanent settlement was made about 1631, and the city was chartered in 1867. Population in 1900, 6122.

Sac'rament, a word applied to certain rites of the Church, chiefly to that of baptism and that of the eucharist. In the Roman Catholic and Greek churches there are seven sacraments, baptism, confirmation, the eucharist, penance, extreme unction, holy orders and matrimony. The Quakers reject the doctrine of sacraments. Baptism, holy orders and confirmation can be received but once, as they imprint "a character." Under certain conditions the others may be repeatedly received. Most Protestants claim that the sacraments are not in themselves means of grace, but are a solemn covenant between God and the soul. The Congregational denominations, Zwinglians and Socinians hold that a sacrament is the visible representation of something spiritual and invisible and may be without any spiritual value if the spiritual reality be wanting.

Sac'ramen'to, Cal., the capital of the state and the county-seat of Sacramento co., situated on Sacramento River, 90 mi. n. e. of San Francisco, and on the Southern Pacific and the Central Pacific railroads. The city occupies a low plain bordering on the river and is surrounded by beautiful scenery. The streets are broad and lined with shade trees, and they cross each other at right angles. Sacramento is well built. In the business section most of the buildings are of brick or stone, while the residences are generally of wood. The most prominent of the public buildings is the state capitol, completed in 1869 and costing $2,500,000. It is located in the midst of a park of 30 acres, beautifully laid out with walks, flower beds and trees. It is believed that this park contains specimens of all trees that will grow in the climate. Other public buildings are the post-office, the city hall, the courthouse, the city dispensary and Crocker Art Gallery. The Roman Catholic Cathedral is the most prominent church in the city. The exposition building is also worthy of mention. This is maintained by the state agricultural society, whose grounds adjoin the city. Among the educational institutions are the Sacramento Institute, the Christian Brothers' College, Howe's Academy and Saint Joseph's Academy. The California State Library, containing 113,000 volumes, is located here. There is also a public library, with about 30,000 volumes. Among the charitable institutions are the railroad hospital, the Marguerite Home and the Protestant Orphan Asylum.

Sacramento is second only to San Francisco as a manufacturing city of the state. The leading industries include flour and grist mills, lumber mills, foundries and machine shops, breweries and manufactures of furniture, carriages, soap, crackers and saddlery and harness. The chief manufacturing establishment is the repair shops of the Southern Pacific railway, which give employment to over 3000 men. The city also has a large trade in fruit and other agricultural products.

The first settlement was made by Captain John A. Sutter in 1839. Two years later Captain Sutter built a fort and named the place New Helvetia. In 1848 the name was changed to Sacramento and the first lots for the town were sold. During the early fifties Sacramento was an important distributing point for the gold mines in the surrounding country and was connected by stage with Stockton, Maryville and several other places. It became the capital in 1854, and two years later the first railroad reached the city. During its early days the city suffered several times from floods, but later the low land was raised and the city was protected by dikes. Several disastrous fires have also occurred. However, the city has recovered from each of these disasters and has continued to grow and to increase in commercial importance. Population in 1904, 30,300.

Sacramento River, a river of California that rises in the northern part of the state, in Goose Lake. The upper part of the stream is known as the Pitt River. The Sacramento flows westward, then southward and enters Suisun Bay. It is about 600 miles long and is navigable for small steamboats for 300 miles, while larger boats ascend the river as far as Sacramento, which is the only important town on its banks. The Sacramento is the largest river of California.

Sacrifices, *sak'ri fi'zez,* gifts offered to God in religious thanksgiving, atonement or conciliation. The origin of sacrifice is a point much disputed, some claiming that it was appointed by God, others, that it grew out of man's desire to draw near to God. Sacrifices are usually offered to gain the favor of a god, to express thanks for favors received or to atone for sins committed. Among the ancients they were often offered to counteract the wicked disposition of a deity or to turn aside his wrath. The customs of the Jews regarding sacrifice are noteworthy, on account of their very explicit claims to a divine origin and because of their connection with the Christian religion. Details are amply given in the book of *Leviticus.* Few religions, whether ancient or modern, have omitted sacrifices from among their rites. The ancestors of all the existing races in Europe practiced human sacrifices, and similar usages widely prevailed throughout the world.

Sad'dle, a kind of seat for a horse's back contrived for the safety and comfort of the rider. In early ages the rider sat on the bare back of his horse, but in course of time some kind of covering was placed over the back of the animal. Such coverings became afterward more costly and were sometimes richly decorated. The modern riding saddle consists of the tree, generally of beech, the seat, the skirts and the flaps, of tanned pig's skin. The construction and weight vary according to the purposes for which it is to be used. Among the varieties are racing saddles, military saddles, hunting saddles, and side-saddles for ladies. The name saddle is also given to a part of the harness of an animal yoked to a vehicle, being generally a padded structure, by means of which the shafts are directly or indirectly supported.

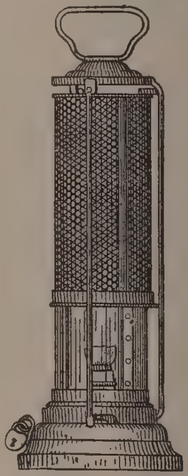
Sadducees, *sad'u seez,* one of the two chief sects or parties existing among the Jews in the time of Christ. Various accounts are given of their origin. Some critics recognize in the Sadducees the descendants and adherents of the Zadok. They were less numerous but more aristocratic than the Pharisees; they possessed the larger share of wealth, and, in consequence, they generally held the highest dignities. A constant feud existed between the two sects. The Sadducees were distinguished for three special beliefs, or doctrines: they repudiated the oral law, they denied the resurrection of the dead and they disbelieved in the existence of angels and spirits, or at least they did not hold the current views regarding these. Annas and Caiphas were Sadducees. This sect disappeared after the destruction of Jerusalem by Titus, while the Pharisees survived.

Sadi, *sah'de,* (about 1184–about 1291), the most celebrated didactic poet of Persia. In his youth he visited Hindustan, Syria, Palestine and Abyssinia and made several pilgrimages to Mecca and Medina. While in Syria he was taken by the Crusaders, and he was actually compelled to labor as a slave at the fortifications of Tripoli. After about fifty years of wandering, he returned to his native city, and in this last quiet and uneventful period of his life he wrote the works on which his fame chiefly rests. These are the *Gulistan,* or *Garden of Roses,* a moral work comprising stories, anecdotes and observations and reflections in prose and verse; and the *Bustan,* or *Orchard,* a collection of histories, fables and moral instructions in verse.

Sadowa, *sah'do va,* BATTLE OF (also known as the Battle of Königgrätz), a battle fought July 3, 1866, between the Austrians and the Prussians. It was a stubbornly contested fight and resulted in the defeat of the Austrians. The Seven Weeks' War was practically decided by the result of this battle.

Safe, a steel box, used to protect valuables from fire and burglars. Safes have double walls of steel, with a space between, usually six or eight inches wide, filled with some substance which does not readily conduct heat. Most compositions used for this purpose contain clay, gypsum and alum, or some similar substance. Sometimes the space contains bottles filled with water. In case of fire the water forms steam, which protects the inner wall from heat. The outside casing is made of very hard steel, and the plates and doors are fitted with the greatest nicety, so that even the finest pointed tool cannot be inserted into the joints. The door is fastened by a combination lock, which is opened and closed by the turning of a handle. When the door is locked and the combination turned, the door cannot be opened until the necessary number of turns have been given to the indicator. One not knowing this number cannot open the safe. Safes used in banks usually have the time for opening regulated by a clock and are considered more nearly proof against burglars than safes without this device.

Safety Lamp, a lamp for lighting coal mines without exposing the miners to the explosion of a gas called *fire damp.* The first safety lamp was invented by Sir Humphry Davy in 1816, and until quite recently his pattern, with some slight modifications, was in general use. It consists of an ordinary oil lamp, surrounded by a cylinder of wire gauze, which is locked over the lamp after it is lighted. A later pattern, invented by George Stephenson, has a glass chimney, as well as the wire gauze, and the air to feed the flame enters through a perforated ring, just below the wick. The principle of the safety lamp is that flame will not pass through the meshes of a fine wire gauze. If the lamp is taken into the vicinity of fire damp the gas will enter the chamber surrounded by the wire and ignite, but the flame



SAFETY LAMP

will not pass through to ignite the gas surrounding the lamp. However, the prudent miner, seeing the gas ignite within his lamp, will immediately move to another part of the mine. See FIRE DAMP.

Safety Valve, a contrivance for relieving the pressure of steam before it becomes too great for the calculated strength of the boiler. The most common form of safety valve on steam boilers is a lid pressed against a hole, by either a spring or a weight. The valve is gauged to open at a pressure which is several pounds below that which the boiler is estimated to carry with safety. When this pressure is reached, a portion of the steam escapes and prevents the pressure being raised beyond the point at which the valve is gauged. The valve is round, is beveled round the edge, and is furnished with a spindle which moves loosely in a guide attached to the seat; the seat is beveled to fit the edge of the valve. On locomotive and ship boilers, the valve is pressed against the seat by a spring arrangement; but on stationary boilers a weight should always be employed. See BOILER.

Saf′flower, a large, thistle-like plant, with orange-colored flowers, belonging to the Compositae family. It is cultivated in China, India, Egypt and the south of Europe. An oil is expressed from the seeds, which is used as a lamp oil. The dried flowers afford two coloring matters, a yellow and a red, the latter being that for which they are most valued. They are chiefly used for dyeing silk, affording various shades of pink, rose, crimson and scarlet. Mixed with finely powdered talc, safflower forms a common variety of rouge. In some places it is used in place of the more expensive saffron and for adulterating the latter.

Saf′fron, a low ornamental plant, with grass-like leaves and large, crocus-like purple flowers, cultivated in the East and in southern Europe for the sake of its stigmas. These, when dried, form the saffron of commerce, which has a deep orange color, a warm, bitterish taste and a sweetish, penetrating odor. As it takes the stigmas of more than four thousand flowers to make an ounce of saffron, it has always been very expensive. Its orange-red extract is used by painters and dyers, and the saffron itself is employed in cookery and confectionery, as a coloring and flavoring substance. Until recently it was highly regarded as a drug.

Sagas, *sa′gaz,* (tales), the name given among the Icelanders to a class of prose epics of a mixed character, blending fiction with authentic narrative. Some detail particular events relating to politics or religion, some tell the history of a particular family and others narrate the lives of kings and other eminent persons. Originally they were composed for oral recitation, and before the twelfth century they were preserved only in the memories of the people. There are often, therefore, varying versions of the same events. Between the twelfth and fifteenth centuries, numbers of these detached tales were collected, written down, amplified or curtailed and worked into a series of consecutive narratives. The sagas of the west of the island are the more elegant in style, and this circumstance is attributed to Celtic influence. Among the more important sagas are the *Saga of Gisli,* the outlaw; that of the hero and poet Egill; the *Laxdoela Saga,* the story of the Icelandic heroine Gudrun; the *Saga of Grettir the Strong,* and the *Saga of Nial,* a complex saga of great legal and historical value. A number of the most interesting sagas are to be had in English translations.

Sagasta, *sa gahs′ta,* PRAXEDES MATEO (1827–1903), a Spanish statesman. He began as a civil engineer, but at the age of twenty-seven he drifted into politics. In 1854, he was elected to the Constituent Cortes, and he had a part in most of the exciting events of Spanish history during the last half of the nineteenth century. He took a prominent part in the insurrections of 1856 and of 1866, and after each he had to flee to France. Sagasta was successively minister of state, minister of foreign affairs, minister of the interior and president of the council. In 1881, he first came to the head of the government, and during the remainder of his life he was in power much of the time. Thoroughly in favor of autonomy for Cuba, he did what he could to avert the war with the United States, and when he found this impossible, he resigned. In December, 1902, he was deposed from the office of premier for the last time. He was one of the greatest Spanish statesmen of modern times.

Sage, *saje,* a plant of the mint family, growing in the temperate and warmer regions. They are herbs or shrubs of widely varying habit, usually with entire or cut leaves and variously colored flowers. The best known is the *garden sage,* a little shrubby plant, with rough, grayish leaves and rather small, bluish flowers. This plant is much used in cookery and is supposed to assist the stomach in digesting fat and luscious foods. Another species, a beautiful red one growing in Brazil, is a popular summer-flowering plant.

Sage, Russell (1816–1906), an American capitalist, born in Oneida County, N. Y. He was reared on a farm, received a meager education and worked his way from the position of errand boy to that of proprietor of a wholesale grocery house and member of Congress. He moved to New York in 1863 and by judicious investments in railroad stocks acquired a fortune and became director of many railroads, banks and other corporations.

Sage Grouse, the largest grouse found in America. It inhabits the sage brush plains of the west and, when fully grown, is about two and one-half feet in length. On each side of the neck of the male is an inflatable sack, like that of the prairie chicken (See Grouse). The flesh of the sage grouse is usually tainted by its food, so that the taste is not pleasant.

Saghalien, *sah'ga lyeen,* or **Sakhalin,** *sak'ka lyeen,* or **Tarrakai,** a long island in the North Pacific, off the east coast of Asia and north of the island of Yezo, from which it is separated by Perouse Strait. It is bounded on the east by the Sea of Okhotsk and is separated from the mainland by the Gulf of Tartary. The island is 570 miles long and from 17 to 90 miles wide. Its area is about 25,000 square miles. The surface is mountainous, the highest peak having an altitude of 5000 feet. A large part of the island is covered with forests, though it contains some pastures and prairies. There are large deposits of lignite coal, and many fur-bearing animals are found. Formerly this island was a Russian possession, but at the treaty that closed the Russo-Japanese War in 1905, the southern half of it was ceded to Japan. See Russo-Japanese War.

Sag'inaw, Mich., the county-seat of Saginaw co., 65 mi. n. e. of Lansing and 100 mi. n. w. of Detroit, on the Saginaw River, at the head of deep water navigation, and on the Grand Trunk and several lines of the Pere Marquette and the Michigan Central railroads. It is the third city in the state, covers an area of about thirteen square miles and is surrounded by a rich agricultural region. The educational institutions include the Germania Institute, Saginaw Valley Medical College, a free manual training school, two public high schools and the Hoyt and the public libraries. The city contains the Saginaw, Saint Mary's and Women's hospitals, a home for the friendless, Saint Vincent's Orphanage and other charitable institutions. Some of the other prominent buildings are the courthouse, the postoffice, the city hall, the Masonic Temple and Arbiter Hall.

Saginaw was formerly one of the greatest lumber-manufacturing centers in the country, and it still has a very extensive lumbering industry. The future of the city depends chiefly upon the extensive coal fields and upon the rich agricultural country, which is especially productive of sugar beets. There are also valuable salt deposits in the vicinity. The city contains sugar mills, plate glass works, iron, steel and wood-working factories, breweries, flour mills and a large number of wholesale houses. The town was laid out in 1836 and was incorporated in 1851. Saginaw was created in 1890 by the consolidation of Saginaw City and East Saginaw, which are on opposite sides of the river. Population in 1904, 46,610.

Sagittarius, *saj'it ta're us,* (the archer), the sign of the zodiac entered by the sun about November 22. In ancient astrology the symbol (♐) represented the arrow of the archer.

Sa'go, a starchy product obtained from the trunk of several species of palms which grow in the East Indies. The palm from which the finest sago is prepared forms immense forests on nearly all the Moluccas, each stem yielding from about 100 to 800 lbs. of sago. The tree is about thirty feet high and from eighteen to twenty-two inches in diameter. It is cut down at maturity, and the pith is extracted and reduced to powder, like sawdust. The woody parts are next separated by washing, and the meal is laid to dry. Sometimes seven hundred pounds are obtained from a single tree. For exportation the finest sago meal is mixed with water and then rubbed into small grains of the

SAGO PALM

size and form of coriander seeds. The Malays have a process for refining sago and for giving it a fine pearly luster, the method of which is not known to Europeans; but there are strong reasons to believe that heat is employed, because the starch is partially transformed into gum. Sago forms a light, wholesome, nutritious food. It is also largely used in the manufacture of soluble cocoas and for adulterating the common varieties of arrowroot.

Saguenay, *sag e nay′*, a river of the Province of Quebec, rising apparently in Lake Saint John, but really having its source in the numerous streams that flow into this lake. The Saguenay has a length of about 110 miles and enters the Saint Lawrence 120 miles northeast of Quebec. It is one of the largest tributaries of the Saint Lawrence and is noted for its great depth in the lower part of its course and for its remarkably wild and picturesque scenery. For more than 50 miles the river flows between nearly vertical walls of rock, which rise to heights varying from 300 to 1700 feet. The town of Tadusac, at its mouth, is one of the chief watering places of Canada.

Sahara, *sa hah′ra*, a desert region of northern Africa. It extends from 12° 30′ to 30° north latitude. Its boundaries are indefinite, but in general it is considered to be bounded on the s. by the Sudan, and on the n. it forms parts of Egypt, Tripoli, Tunis, Algeria and Morocco, in one place extending even to the Mediterranean coast. The length from east to west is about 3000 miles, and the area, about 2,000,000 square miles. The surface of the Sahara is broken and contains numerous plateaus, separated by valleys, which it is supposed were formerly beds of streams. Some regions also are mountainous. The highest points are found in the region of Tibesti, in the eastern part, where there is an elevation of 6200 feet; at Tarso, where there is an elevation of 7800 feet, and another at Tahat, in Ahagjar, of nearly equal altitude. The summits of these mountains are covered with snow during a portion of each year. The deepest depression in the Sahara is west of the Gulf of Gabes, where the surface reaches a descent of from 60 to 70 feet below sea level. This immense area of the Sahara is divided into two well-recognized types of surface—one known as the stony desert, or Stony Sahara, its surface being characterized by bare rock masses; the other known as the sandy desert, or Sandy Sahara, characterized by a surface covered with fine gravel or shifting sands.

The climate varies somewhat from north to south. In the southern half during the hot season the thermometer may rise as high as 115° or 120°. However, the rapid evaporation causes the temperature to fall during the night, so that the nights are cool. In the northern half there is less variation, and the heat is not so extreme. On the highest altitudes and in some of the regions where the atmosphere is the driest, water freezes at night, even after a very hot day. The entire region is characterized by storms, which are much dreaded on account of the quantities of fine sand blown through the atmosphere. Sometimes these storms are so severe as to cause the death of travelers and even of beasts of burden. See SIMOOM.

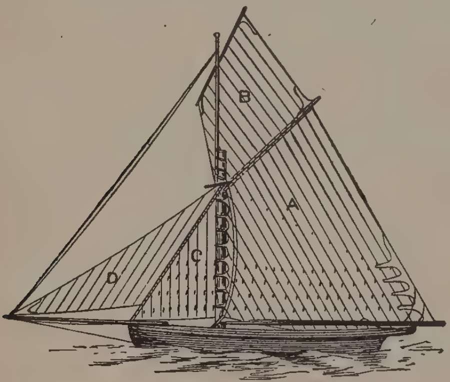
Wherever water can be obtained, abundant crops of tropical fruits, such as dates, figs, peaches and grapes, are raised. Millet and other cereal crops can also be grown with success. These fertile spots are found in the vicinity of springs and lakes, and in a few localities they have been developed by the sinking of artesian wells. They form the well-known oases of the desert. But few animals are found in the interior of the desert, since, because of the lack of water, it forms as effective a barrier to their migration as does an arm of the sea. Around the oases and the outskirts, the lion and panther and a number of species of antelope are found. Lizards, venomous serpents and jumping mice, or jerboas, are found in the interior.

Notwithstanding its forbidding aspect, the Sahara is not entirely devoid of inhabitants. There are a number of well-marked caravan routes across it, some leading from Timbuktu and other cities of the Niger, and others from Lake Chad, to the Mediterranean ports. The inhabitants are engaged in caravan trade or in collecting and selling salt, which is obtained in large quantities at Bilma and some other localities. See DESERT; SUDAN.

Saigon, *si gohn′*, the capital of French Cochin-China, situated on the Saigon River, 35 mi. from its mouth. It is connected with Mekong by canal and with Mytho by rail. The river is navigable at high tide, and the city has a navy yard, a dry dock and repair docks, besides extensive wharves. It consists of two parts, the commercial town and the native town. It is regularly built and has good modern buildings, surrounded by gardens, as well as pleasant promenades. The chief structures are the citadel, the government palace, the arsenal, the astronomical observatory and the buildings of a number of colleges. The city also maintains botanical and zoölogical gardens. The trade is large and is carried on with the Dutch East Indies and the Philippines and with numerous ports of Asia and Europe. Population in 1901, 47,577.

Saikio, *si ke′o.* See Kioto.

Sail, a piece of cloth or tissue of some kind, spread to the wind, which is thus made to impel a vessel through the water. Sails are usually made of several breadths of canvas, sewed together with a double seam at the borders and edged all round with a cord or cords, called the *boltrope* or *boltropes.* A sail extended by a yard hung by the middle is called a *square sail*; a sail set upon a gaff, boom or stay, so as always to hang more or less in the direction of the vessel's length, is called a *fore-and-aft sail.* The upper part of every sail is the *head*; the lower part, the *foot*; the sides are called *leeches.* The two lower corners of a square sail are called *clues* and are kept extended by ropes called *sheets.* Sails generally take their names, partly at least, from the mast, yard or stay upon which they are stretched; thus, the main course, or mainsail, the main topsail, the main topgallant sail, are, respectively, the sails on the mainmast, the main topmast, and the main topgallant mast. In the accompanying diagram of the sails of a cutter yacht, *A* represents the mainsail; *B*, the gaff topsail; *C*, the foresail, and *D*, the jib.



Saint Albans, *awl′banz,* Vt., the county-seat of Franklin co., 55 mi. n. w. of Montpelier and 2 mi. e. of Lake Champlain, on the Central Vermont railroad. It is on an elevation of nearly 400 feet and has a beautiful location, within sight of the Adirondacks and the Green Mountains. Dairying is the most important industry of the region, and the city has several butter and cheese factories. There are also railroad shops, iron and steel bridge works and manufactories of other iron products. It has a public library, a hospital, a convent, a charitable home and several academies. The village was chartered in 1859, and the city was incorporated in 1897. It was raided by Confederates from Canada on October 19, 1864, and considerable money was taken from the local banks. Population in 1900, 6239.

Saint Augustine, *aw′gus teen,* Fla., the county-seat of Saint John co., situated on Matanzas Sound, 36 mi. s. e. of Jacksonville, and on the Florida East Coast and the Saint Augustine & South Beach railways. The town occupies a low site, only a few feet above the level of the sea. It is an important winter resort and contains many large hotels. There are also numerous gardens containing subtropical plants, and oranges and other subtropical fruits are grown in the surrounding country. The remains of Fort San Marco, or Fort Marion, begun in 1656, are still in existence. There are also ruins of an old wall built by the Spaniards in the sixteenth century. Saint Augustine was settled by the Spaniards in 1565 and is the oldest town in the United States. Population in 1900, 4272.

Saint Barthol′omew, Massacre of. See Bartholomew's Day, Saint.

Saint Bernard, *sahN bur nahr′,* Great, a celebrated Alpine pass in Switzerland, Canton Valais, on the mountain road leading from Martigny, in Switzerland, to Aosta, in Piedmont. It rises to a height of 8150 feet. Almost on the very crest of the pass is the famous hospice, next to Etna observatory the highest inhabited spot in Europe. The hospice was founded in 962 by Saint Bernard of Menthon, for the benefit of pilgrims to Rome. It is the mission of the monks, with the aid of the Saint Bernard dogs, to rescue the travelers who are lost in the snows on the mountains. The pass was much used by the Romans. In May, 1800, Napoleon led an army of 30,000 men, with artillery and cavalry, into Italy by this pass.

Saint Bernard, Little, a mountain in Italy, belonging to the Graian Alps, about 10 mi. s. of Mont Blanc. The pass across it, one of the easiest in the Alps, is supposed to be that which Hannibal used. It is 7170 feet above the sea.

Saint Bernard, *bur′nahrd,* **Dog,** the largest of the domestic dogs. It takes its name from the hospice of Saint Bernard,where it is used by the monks to rescue the travelers who have been overcome in the snowstorms on the mountains. There are two varieties. the smooth-coated and the rough-coated. The standard breed has a tall, strong and erect figure, a large head and an intelligent expression. The coat is dense and smooth in one variety and is rough, long and wavy in the other. The color may be black, red or white in patches. About 1860 these dogs were first imported to Great Britain, where they were greatly admired, because of their size and beauty. Many of the finest dogs measure over thirty inches high and weigh over one hundred fifty pounds.

SAINT BERNARD DOG

Saint Cath'arine's, a city of Ontario Canada, and county-seat of Lincoln co., situated on the Welland Canal and on the Grand Trunk & Niagara and the Saint Catharine's & Toronto electric railways, 12 mi. n. w. of Niagara. It is the center of a number of important industries, including machine shops, mills and factories, and is also engaged in shipbuilding. The mineral springs near by have given the town considerable celebrity. Population in 1901, 9946.

Saint Charles, Mo., the county-seat of Sain Charles co., 20 mi. n. w. of Saint Louis, on the Missouri River and on the Missouri, Kansas & Texas and the Wabash railroads. The city is in a rich agricultural region and contains a large car factory, besides manufactures of cob pipes, flour, brick, tile, furniture and other articles. There is also a considerable trade in limestone, tobacco, corn and other farm products. It is the seat of the Lindenwood Female College, Saint Charles Military College and the Sacred Heart Academy. Other prominent buildings are the courthouse, the churches, the schools and the Saint Joseph Hospital. It was settled in 1769 and was incorporated in 1849. Population in 1900, 7982; estimated in 1904, 10,000.

Saint Christopher or **Saint Kitts,** a British island in the West Indies, one of the Leeward Islands, 23 miles in length and about five in breadth. The interior consists of many rugged precipices and barren mountains. Of these the loftiest is Mount Misery, more than 4000 feet high. The chief town, a seaport with open roadstead, is Basse-Terre. The island was discovered by Columbus in 1493 and was colonized by the English in 1623. Population in 1901, 29,782.

Saint Clair, Arthur (1734–1818), an American soldier, born at Edinburgh, Scotland. He graduated at the University of Edinburgh, studied medicine and came to America as ensign during the French and Indian War. He took part in the expeditions against Louisburg and Quebec, but resigned in 1762 and engaged in manufacturing in Ligonier Valley, Pa. In 1776, as brigadier general of Pennsylvania militia, he organized the New Jersey troops and fought at Trenton and Princeton, becoming major general in 1777. As commander at Ticonderoga, he evacuated the fort at the approach of Burgoyne, a detachment of his force being severely defeated at Hubbardton; he was court-martialed, but acquitted. He fought later with Greene in the South, was chosen to Congress and became its president in 1787. He was also made first governor of the Northwest Territory, and at a battle near the Miami River, November 4, 1789, he was severely defeated by the indians of the northwest. He died in poverty and obscurity.

Saint Clair, Lake, a lake in North America, situated between Ontario and Michigan and between Lake Huron and Lake Erie, connected with the former by Saint Clair River, with the latter by Detroit River. It is 30 miles long, its greatest breadth is 24 miles and its area is 360 square miles. It contains several fine islands. See Detroit River.

Saint Cloud, a town of France, in the Department of Seine-et-Oise, 6 mi. s. w. from Paris. It is celebrated for its château and for its magnificent park. As the residence of the monarchs of France, Saint Cloud is historically interesting. Louis XIV bought the old château and presented it to his brother, who enlarged and transformed it into a splendid palace, which became the residence of Henrietta, queen of Charles I of England, during her exile. It was chosen by Napoleon for his residence, was the summer residence of Napoleon III and was greatly damaged in the Franco-German War. Population in 1901, 6205.

Saint Cloud, Minn., the county-seat of Stearns co., 65 mi. n. of Minneapolis, on the Mississippi River and on the Northern Pacific and the Great Northern railroads. The city is in a grain-growing and stock-raising district and has large granite quarries. There is a valuable trade, and the rapids in the Mississippi furnish good water power. There are flour mills, foundries, machine shops, railroad shops and woodworking establishments. The city has the state reformatory and a state normal school. It also contains a public library, an academy of music, a hospital and a home for the aged. The place was settled about 1852 and was incorporated in 1868. Population in 1905, 9422.

Saint Croix, *kroi,* a river which rises in northwestern Wisconsin, flows southwest and falls into the Mississippi about 20 miles below Saint Paul. Its total length is about 200 miles, and it is navigable to about 55 miles from its mouth. It forms part of the boundary between Minnesota and Wisconsin.

Saint-Cyr, *saN seer',* LAURENT GOUVION, Marquis de (1764–1830), a famous French general, marshal of France, born at Toul. He entered the army of the Republic as a volunteer in 1792, took part in the campaigns along the Rhine in Holland and in 1798 succeeded Masséna as commander of the army in Italy. After a series of brilliant successes he joined Moreau in Germany. Napoleon made him ambassador to Spain in 1801, and two years later he was placed at the head of the army of occupation in Naples. During the Russian campaign he commanded a corps and was made marshal after a great victory at Polotzk. After the downfall of Napoleon, he became minister of war and served in the position for several years.

Saint Denis, *saN de ne',* a town of France, in the Department of the Seine, 6 mi. n. of Paris. It contains the famous abbey church of Saint Denis, a fine Gothic structure, in part dating from the eleventh century or earlier. Dagobert was buried in the church, which became the burial place of the kings of France; and all the rulers, from Hugh Capet down, lay there till 1793, when the revolutionary fury of the Convention caused the tombs to be rifled and the church to be demolished. Under Napoleon I and later rulers it was restored to its former splendor and is now considered one of the finest of Gothic monuments. Saint Denis contains a school for the daughters of the members of the Legion of Honor. There are cotton and flour mills, chemical works and various manufactures. The annual market is one of the oldest in France. Population in 1901, 60,808.

Sainte-Beuve, *saNt böv',* CHARLES AUGUSTIN (1804–1869), a famous French critic and essayist. After leaving the university at Boulogne and the Collège Charlemagne in Paris, he studied medicine for a time. He first attracted attention, however, through articles on literary topics, published in various journals. Three volumes of poetry and a novel are among his works, but it is for his literary studies in the *Revue des Deux Mondes* and for his so-called *Chats* in the *Constitutionnel* that he is chiefly famous. For a time under Napoleon III he was a professor in the Collège de France, and he was a warm partisan of Napoleon.

Saint Eli'as Mountains, a range of mountains located in the southeastern part of Alaska and the northwestern part of Canada, comprising a broad, elevated chain, with numerous peaks and short ridges. The loftiest peaks are Mount Logan, estimated at from 18,000 to 19,500 feet high, and Mount Saint Elias, 18,026 feet high. Other prominent peaks to the southeast are Mount Fairweather, Mount Cook and Mount Vancouver. This range of mountains gives rise to numerous glaciers, the largest being the Malaspina.

Saint Etienne, *saN a te en',* a town of southern France, in the Department of Loire, on the Furens, 32 mi. s. w. of Lyons. The town stands in the center of one of the most valuable mineral fields of France; and in addition to the extensive collieries, blast-furnaces and other iron works in the vicinity, it has manufactures of ribbons, silks, cutlery and firearms. The collieries alone employ about 16,000 men. Population in 1901, 139,350.

Saint Gau'dens, AUGUSTUS (1848–1907), an American sculptor, born in Dublin. His early years were spent in the employ of a cameo cutter, but in his nineteenth year he went to Paris, to study art at the Ecole des Beaux Arts, where he became influenced by the movement which was based on the Italian Renaissance, rather than on classic ideals. His first production was *Hiawatha,* executed in Rome. Among his statues are *Admiral Farragut,* in New York; *Abraham Lincoln,* in Chicago, and the statue of *Diana,* which was placed on the roof of the Agricultural Building at the World's Columbian Exposition in Chicago, in 1893. The *Shaw Memorial,* on Boston Common, representing Colonel Shaw at the head of his colored troops, and the bronze equestrian statue of Sherman, in Central Park, New York, counted among the half dozen finest equestrian statues in the world, are the most celebrated of the sculptor's work. Saint Gaudens's art is distinctly American, and he was responsible, in a large measure, for the development of the art of sculpture in the United States.

Saint George. See FREETOWN.

Saint George's Channel, the arm of the sea which separates Ireland from Wales, south of the Irish Sea. From Holyhead and Dublin, on the north, to Saint David's Head and Carnsore Point, it extends about 100 miles, with a breadth varying from 60 to 95 miles. The bottom is chiefly sand and gravel.

Saint Gotthard, *saint goth'ard* or *saN gotahr'*, a mountain group in Switzerland, on the confines of the cantons Tessin and Uri, belonging to the Lepontine, or Helvetian, Alps, which it connects with the Bernese Alps. Its culminating point has a height of 10,600 feet. A railway tunnel has been pierced through this mountain group, between Göschenen, on the north, and Airolo, on the south, thus directly connecting the railway system of north Italy with those of Switzerland and western and central Germany. See SAINT GOTTHARD TUNNEL.

Saint Gotthard or **Sankt Gotthard,** *sahnkt got'hahrt*, **Tunnel,** a tunnel through the Saint Gotthard Pass, in Switzerland, connecting Airolo with Göschenen. It is nine and one quarter miles long, twenty-six feet wide and twenty-one and one-third feet high. The tunnel is lined with masonry throughout its entire length. The roof is a brick arch, and the sides are of rubble. The expense of construction was assumed jointly by the governments of Italy, Switzerland and Germany. At its highest point this tunnel is 3786 feet above sea level and 3150 feet below the surface of the mountain. The entrances are reached by spiral tunnels, through which the railway ascends from the valley below. At the time of its construction the Saint Gotthard was the largest tunnel in the world.

Saint Hele'na, an island in the South Atlantic, 1200 miles w. of the nearest African coast, belonging to Great Britain. Its position in the ocean thoroughfare from Europe to the East has made it a place of call for vessels, while it has acquired special celebrity as the place of Napoleon's residence in exile, from 1816 till his death in 1821. There are neither manufactures nor trade of any importance. About one-fifth of the entire surface is available for cultivation. Population, 9850.

Saint Ignatius, *ig na'she us*, **College,** an institution at Chicago, Ill., for secular and ecclesiastical education, under the control of the Jesuit Fathers, founded in 1869, since which time it has had an annual increase of students. Its curriculum embraces logic, metaphysics, theology, ethics, mathematics, astronomy, chemistry, geology, Greek, Latin, modern languages, elocution and English literature. The enrollment is over 600.

Saint John, the capital of New Brunswick, Nova Scotia, situated at the mouth of the Saint John River, 190 mi. n. w. of Halifax, and on the Intercolonial, the Canadian Pacific and the New Brunswick Southern railroads. The city has a picturesque site, overlooking an excellent harbor. It is regularly laid out and contains a number of good buildings. It ranks very high among the shipping centers of the world. It has direct steamship connection with London, Liverpool, Glasgow, Bristol, Dublin, Belfast, Havre, Antwerp, South Africa, and the West Indies. Its annual trade amounts to more than fifty millions of dollars The tonnage of its vessels has increased from 50,892 in 1896 to 474,620 in 1909 The leading industries of the town include the manufacture of cotton and woolen goods, boots and shoes, machinery, tools, wooden ware, carriages, agricultural implements, lumber, paper, soap and candles. The fisheries are also important, giving employment to several hundred men. Saint John was chartered in 1785. It was nearly destroyed by fire in 1877, but was rapidly rebuilt. Population in 1901, 40,711.

Saint John, JOHN PIERCE (1833–), an American lawyer and political leader, born at Brookville, Ind. He was educated in rural schools, served as captain and lieutenant colonel in the Civil War and afterward settled in Kansas, where he was chosen to the state Senate in 1872 and served as governor from 1879 to 1883. In the following year he was nominated for president by the Prohibition party, but later he left the organization and advocated independence in politics, favoring prohibition, woman's suffrage, bimetallism and anti-imperialism. He frequently lectured upon these subjects.

Saint John of Jerusalem, KNIGHTS OF. See JOHN, KNIGHTS OF SAINT.

Saint John River, a river of New Brunswick, originating from two branches, one rising in the northern part of Maine and the other in the Province of Quebec. It flows northeastward and then southeastward and enters the Bay of Fundy. Its length is about 500 miles, and for 225 miles it is navigable for small steamers during high water, while larger boats can ascend the river as far as Frederickton. In the upper part of its course the Saint John forms a part of the boundary between Maine and the provinces of Quebec and New Brunswick.

Saint John's, the capital of Newfoundland, situated on the northern point of the southeastern peninsula of the island, 550 mi. n. e. of Halifax, on the Newfoundland railway. The city occupies a commanding site, which rises abruptly from the harbor, which is land-locked and guarded by modern fortifications. Among the chief public buildings are the Roman Catholic cathedral, the Anglican cathedral, the house of parliament, the postoffice and government house, Saint John's Athenaeum and Saint Bonaventure College. The inhabitants are chiefly engaged in fisheries and in the refining of seal oil. Other industrial establishments worthy of mention include foundries, machine shops, tanneries, soap factories, and manufactories of boots and shoes and of malt and spirituous liquors. It is an important station for the Atlantic whaling and sealing fleets. Population in 1901, 29,594.

Saint Johns'bury, Vt., the county-seat of Caledonia co., 34 mi. n. e. of Montpelier, on the Passumpsic River and on the Saint Johnsbury & Lake Champlain and the Boston & Maine railroads. The village contains the large works of the Fairbanks Scale Company, besides manufactures of steam hammers, agricultural implements and other articles. It has the Fairbanks Museum of Natural History, the Saint Johnsbury Academy, an art gallery and a public library. It was settled in 1786 and was incorporated in 1884. Population in 1900, 5666.

Saint Joseph, Mich., the county-seat of Berrien co., 60 mi. e. of Chicago, on Lake Michigan, at the mouth of the Saint Joseph River, and on the Pere Marquette and the Indiana, Illinois & Iowa railroads. The city has regular steamship connection with other lake ports, is a popular summer resort and entertains many pleasure seekers from Chicago. It is in a fruit-growing region and contains lumber and flour mills and manufactures of boats, fruit baskets and other articles. It has a Carnegie Library, Lake Front Park and Battery Beach. Population in 1904, 5322.

Saint Joseph, Mo., the county-seat of Buchanan co. and the third city of the state, situated on the Missouri River, 63 mi. n. n. w. of Kansas City, and on the Atchison, Topeka & Santa Fé, the Chicago, Rock Island & Pacific, the Chicago, Burlington & Quincy, the Chicago Great Western, the Missouri Pacific and a number of other railroads. The town is connected by a steel bridge with Elwood, Kan. The area of the city is about 10 sq. mi. It is built along the bluffs, close to the river, on which it has a frontage of about three miles. The city is well laid out, and many of the streets are paved with brick, asphalt or macadam. Among the important buildings are the public library, the courthouse, the Live Stock Exchange, the Carnegie Library, the postoffice, the high school and the city hall. One of the state hospitals for the insane is located here, also the state fish hatchery. The educational institutions include two medical colleges, Sacred Heart Academy and a number of private and parochial schools. The leading charitable institutions are the Memorial Home for Aged People, Saint Joseph's Hospital, Ensworth Hospital and the Home for Little Wanderers.

Saint Joseph is the second industrial city of the state. The chief industries are connected with slaughtering and meat packing, and the amount of business done by the packing houses exceeds $50,000,000 each year. Other important industries include the manufacture of overalls and shirts, harness, collars, saddles, plows, trunks, furniture, shoes, flour, woolen goods, machinery and foundry products.

The first settlement was made in 1826 by an indian trapper and trader. The first postoffice was established in 1840, and the town was laid out in 1843 and given its present name. It became the county-seat three years later and in 1853 was chartered as a city. During the emigration to the California gold fields, Saint Joseph was an important outfitting post. Since the Civil War its growth has been rapid. Population in 1900, 102,979.

Saint Just, *zhüst*, Antoine (about 1767–1794), one of the leaders in the French Revolution. He adopted with enthusiasm the radical republican principles, became the firm supporter of Robespierre and one of the most energetic and resolute members of the Montagnards. The guillotine was his general answer to all arguments and actions which did not harmonize with his own. He fell with Robespierre and perished on the same scaffold with him.

Saint Kitts. See Saint Christopher.

Saint Law'rence, one of the largest rivers of North America, generally considered to rise in Lake Ontario, from which it flows through a broad channel, filled with islands, forming Thousand Island Park, whence it takes an east-northeast direction and enters the Atlantic Ocean through the Gulf of Saint Lawrence. The river is one of the largest in the world, and by the best authorities it is considered to be second only to the Amazon in the amount of water it discharges. Its actual source is in the Saint Louis River, in the northeastern part of Minnesota. The Saint Lawrence drains the region occupied by the Great Lakes, with an area of about 500,000 square miles. Its entire length, beginning with the Saint Louis, is from 2100 to 2200 miles. Previous to its issuance from Lake Ontario the stream has a number of names in different localities; the river connecting Lake Superior with Lake Huron is known as the Saint Mary's, the portion connecting Lake Huron with Lake Erie is divided by Lake Saint Clair into the Saint Clair River and the Detroit River, while the stream connecting Lake Erie with Lake Ontario is known as the Niagara River. The Saint Lawrence proper is over 500 miles long and varies in width from one to three miles, expanding in Lake Saint Peter to about seven miles. Between Lake Ontario and Montreal several rapids occur, the most noted of which are the Long Sault, the Cedar, the Cotau, the Cascade and the Lachine. The aggregate length of these is about 40 miles. When going down stream, steamers pass through these rapids without difficulty, and their obstruction is overcome by a series of canals for steamers going up stream. The largest ocean steamers can ascend the river as far as Montreal, and the tide ascends to Three Rivers. The chief tributaries from the north are the Ottawa, the Saint Maurice and the Saguenay; and from the south, the Richelieu, the Saint Francis and the Chaudiere. See DETROIT RIVER; SAULT SAINTE MARIE CANAL; NIAGARA FALLS AND RIVER.

Saint Lawrence, GULF OF, a large inlet of the Atlantic Ocean, extending into Canada between Nova Scotia and New Brunswick and the eastern part of the Province of Quebec. It is partially enclosed by Newfoundland and Cape Breton Island, and it communicates with the Atlantic Ocean by three channels—Belle Isle Strait, separating Newfoundland from the Province of Quebec; the Strait of Canso, separating Cape Breton from Nova Scotia, and Cabot Strait, which is the main outlet and is 63 miles wide. The gulf contains Anticosti and Prince Edward islands, the Magdalens and numerous other smaller islands. Its waters abound in fish, and its depth is such as to make it navigable for the largest ocean vessels.

Saint Leger, *saint lej'ur* or *sil'lin jur,* BARRY (1737–1789), a British soldier in the American Revolution. He entered the army as ensign in 1756 and fought in America during the last French and Indian War. In the Revolution he was given command of one of the three expeditions into New York State in 1777 (See REVOLUTIONARY WAR IN AMERICA), his purpose being to descend the Mohawk River from Lake Ontario and join Howe and Burgoyne at Albany. His plan was frustrated, however, by his defeat at the Battle of Oriskany. He served during the remainder of the war, conducting guerrilla operations on the frontier.

Saint Louis, *loo'is* or *loo'e,* Mo., the chief city of the state and the fourth in population in the United States, situated on the west bank of the Mississippi River, 21 mi. below the mouth of the Missouri, 283 mi. s. by w. of Chicago, 573 mi. s. of Saint Paul and 639 mi. n. of New Orleans. The city extends along the river for a little over 19 miles and reaches westward for about 6 miles. Its area is 62½ square miles. Saint Louis is beautifully situated on high and gently undulating land, which rises gradually from the Mississippi, the country to the west of it being a rolling plain of about 200 feet altitude. The city is admirably laid out. The eastern boundary conforms to the great bend in the river, and the streets near this are parallel with the river bank; further westward they gradually straighten and assume a north and south direction. Most of the streets crossing these extend east and west. Market Street divides the city into north and south sections for numbering, all of the streets that cross Market being called *north* on one side of it and *south* on the other side. The streets running north and south are numbered, beginning with the river and extending as far as Twenty-fifth Street. Those running east and west are named, and in numbering the buildings, each block begins a new hundred. Broadway is one of the chief streets extending north and south, and it runs parallel with the river. This and Olive Street are the fashionable promenades and also contain the leading retail stores. Washington Avenue is one of the widest and handsomest streets in the city. Near the river this is occupied by the wholesale dry goods trade, and its western portion is given to fashionable residences. The fashionable part of the city is at the west end, and Lindell

Avenue is one of the principal streets passing through it.

Parks. The public parks and squares embrace over 2200 acres. Among the largest parks is Forest Park, on the west side, embracing nearly 1400 acres. Portions of this are quite heavily wooded with oak, but the western half of it was occupied by the Louisiana Purchase Exposition, and this was cleared to make room for the buildings and driveways and walks. Carondelet Park, on the south side, has an area of 180 acres and is noted for its beautiful scenery. In the south central part of the city is Tower Grove Park, still larger, containing beautiful lawns and shrubbery, and celebrated for its statues of Shakespeare, Humboldt and Columbus. Near this on the north is Shaw's Garden, officially known as the Missouri State Public Garden. This park is famous for its botanical garden and its arboretum, which contains all kinds of trees and shrubbery that will grow in the climate. On the north side of the city are O'Fallon Park, of 160 acres, bordering on the bluffs of the river, and the fair grounds, which contain a zoölogical garden, a large amphitheater and a race course. There are many smaller parks scattered about the city. Of these, Lafayette Park was formerly the most beautiful, but the tornado in 1896 destroyed nearly all of its fine trees. This park contains a fine statue of Thomas H. Benton.

Buildings. Saint Louis is well built, and its appearance gives one the impression of strength and durability, rather than of ornament. Nearly all buildings are of brick or stone. The older part of the city, near the river, contains a few buildings of historic interest, in which traces of the old colonial style of architecture are still found, but they are not otherwise important. Among the public buildings is the courthouse, on Broadway, in the form of a Greek cross, surmounted by a dome nearly 200 feet high. The interior of the dome is decorated with frescoes, illustrating events in the history of the city or country. The Federal building, on Olive Street, is a magnificent structure of granite, erected at a cost of $8,000,000. It contains the customhouse, the United States subtreasury and the postoffice. The city hall is a modern structure of brick and stone, that cost over $2,000,000. It occupies an entire square and is surmounted by a tall tower. West of the city hall, on Market and Eighteenth streets, is the union station, one of the largest and finest buildings of its kind in the world, exceeded in size only by the south terminal station in Boston. Among the business blocks worthy of notice are the mercantile library, the building of the board of education and the public library, Odd Fellows' Hall, the Commonwealth Trust Building, the Equitable Building, the Boatman's Bank, the Laclede Building and the Union Trust. Other buildings worthy of note, because of their beauty, are the new Roman Catholic Cathedral, the Protestant Episcopal Cathedral, the Second Presbyterian Church, the Pilgrim Congregational Church, the Union Methodist Church, the Shaare Emeth Synagogue and the Museum of Fine Arts. The Planters', the Southern and the Lindell hotels are new and commodious structures, built upon the sites of the old hotels of the same names, which previous to the Civil War were among the most famous hostelries of the Union.

Institutions. Washington University is the leading educational institution of the city. This occupies a beautiful site in Forest Park. Next in importance is the University of Saint Louis, a Catholic institution (See Saint Louis, University of). The city maintains a normal school in connection with its public schools, and there are numerous institutions of learning, maintained by the various denominations. The libraries include the public library, of over 170,000 volumes, occupying a building erected through the generosity of Andrew Carnegie, who gave the city $1,000,000 for the purpose, and the mercantile library, containing about 130,000 volumes and occupying its own building. The rooms of this library are also of interest because of their collection of paintings and statuary. The city maintains a dispensary, a hospital, an asylum for the insane and a reform school. The state school for the blind is also located here. Besides these institutions, there are numerous others of a charitable and philanthropic nature, maintained by various organizations.

Industries. Saint Louis is the distributing point for a large section of country to the south and southwest, including Texas and Mexico. It is the terminus of twenty-four railways, and consequently has an important wholesale trade and is one of the largest centers of transshipment in the country. The Mississippi is crossed by the great Saint Louis, or Eads, bridge, a structure of granite and steel, which provides a double railway track, sidewalks, a carriage road and street car tracks. The bridge leads into a tunnel for railroads, which passes for more than 4000 feet under the business portion of the city. Three miles north of the Eads bridge is the Merchants' bridge, across which the trains of a number of railways find entrance to the city. In connection with the wholesale business and the transshipment of goods, is maintained the most unique establishment for handling freight in the country. This is known as the Cupples Station, and in this nearly all the freight entering the city over its various lines of railway is handled. So perfect are the arrangements and so complete is the system that 60 cars of freight can be unloaded and as many loaded within 24 hours. The city also has an important river traffic, since the river is navigable to this point at all seasons of the year.

Saint Louis is an important manufacturing center, and the annual output of its factories is valued at about $338,000,000. The chief industries consist in the manufacture of tobacco, flour, beer, glass, agricultural implements, stoves, furniture, carriages, boots and shoes, iron and steel products, brick, white lead, linseed oil and cottonseed oil. There are also numerous smaller industries, covering a wide range of articles.

HISTORY. The first settlement was made in February, 1764, by a party of Frenchmen who ascended the river from New Orleans, and the village was named in honor of Louis XI of France. In 1763, with other American possessions, it was ceded to Spain, and two years later it was made the capital of Upper Louisiana. It remained under Spanish control until 1800, when it was retroceded to France, and in 1803 it became a part of the United States by the purchase of Louisiana. Following this, settlers rapidly crossed the Mississippi River, and Saint Louis began to increase in population. From the start it was a center of trade and supplies, and as the country to the west and south continued to be settled, the town increased in importance. A large number of Germans early settled in the city, and their influence on its business and institutions has always been strong. During the Civil War Saint Louis contained Union and Confederate sympathizers, though the former were in the majority. After the close of that conflict the city continued to grow and prosper. Its business interests have always been conducted on a solid financial basis and after the most conservative methods. In 1896 the city suffered from a tornado which caused widespread destruction. In 1904 it was the site of the Louisiana Purchase Exposition, the largest world's fair that had been held up to that time. Population in 1900, 575,238; in 1906, estimated at a little over 700,000.

Saint-Louis, the capital of Senegal, a French colony in West Africa, situated on an island at the mouth of the Senegal River, about 12 mi. from the Atlantic Ocean. The city is in a very unhealthful location, but it is well laid out and has several substantial buildings. Population, about 20,000.

Saint Louis, UNIVERSITY OF, a Roman Catholic university, established at Saint Louis, Mo., in 1829 by the Jesuit Fathers. It comprises collegiate, preparatory, military, philosophical, medical and theological departments. It has 130 instructors and about 1000 students.

Saint Mark, CATHEDRAL OF, a celebrated church in Venice, facing the east side of the Square of Saint Mark's, or the Piazza. The building is about 250 feet in extent from east to west, and 170 feet from north to south. It is built in the form of a cross. The west front has five large porches, each so deep that the roof over them forms a spacious balcony. In front of the church are three bronze sockets, in which were formerly placed the flagstaffs which supported the banners of Venice. There are also four bronze horses outside the portico, which are said to have been presented to the Roman emperor Nero. These were carried to Paris when Venice was sacked by the French under Napoleon, but were afterwards returned. The cathedral itself is a curious structure, in which several different styles of architecture are combined. The roof is covered with small cupolas, like those of mosques, and the building contains a number of rows of arches, one above the other, so arranged that they seem to have but little purpose and mar the architectural effects; but notwithstanding this, the general appearance is one of magnificence, and the cathedral attracts thousands of visitors every year. The interior is finished almost entirely in mosaic, set in a golden groundwork. Over the central door is a mosaic of Christ, Mary and Saint Mark. In the three domes of the nave are representations of David, Solomon and the prophets; the ascension; the descent of the Holy Ghost, and the Holy Trinity. On the chancel screen are fourteen marble statues of Saint Mark, Mary and the twelve apostles. Another mosaic represents the genealogy of Mary. The church also contains many bronzes and other objects of interest, dating from the fourteenth and fifteenth centuries.

The first church on the site of the cathedral was begun in 830. This was destroyed and was rebuilt in 976. The second church was also destroyed, by fire, and in the eleventh and twelfth centuries it was reconstructed in Byzantine style. The additions made in the fifteenth century were Gothic. Until 1807 Saint Mark's ranked only as a church and was the chapel of the rulers of Venice. Since then it has been the cathedral of the city. See VENICE.

Saint Marys, OHIO, a city in Auglaize co., 22 mi. s. w. of Lima, on the Miami & Erie Canal and on the Ohio Central and the Lake Erie & Western railroads. It is in the oil belt and is surrounded by an agricultural region. Saint Marys Reservoir, near the city, covering 17,600 acres, is the largest artificial body of water in the world and is used as a supply for the Miami & Erie Canal. The principal industrial establishments are wheel factories, chain works, woolen mills, strawboard works and other factories. The city was settled about 1795 and was incorporated in 1820. Population in 1900, 5359.

Saint Mary's River, a river forming the outlet of Lake Superior and flowing into Lake Huron. It flows southeastward for about 50 miles and forms a portion of the boundary between the Province of Ontario and the State of Michigan. Its course is winding, and the stream contains a number of large islands. At the source are the celebrated rapids of Sault Sainte Marie. By the construction of the Sault Sainte Marie Ship Canal and the dredging of the stream in many places, the Saint Mary's River has been made one of the most important waterways of the country. See SAULT SAINTE MARIE CANAL.

Saint Maurice, *mo rees'*, a river of the Province of Quebec, rising in a chain of lakes and flowing southeasterly into the Saint Lawrence, at Three Rivers. It is about 350 miles long. Its chief tributaries are the Ribbon and the Vermilion, from the west, and the Bastonnois and the Croche, from the east. The stream has numerous cascades and a fall of 160 feet about 22 miles above its mouth.

Saint Paul, the capital of Minnesota, and the second city in size in the state, is situated on the Mississippi River, at the head of navigation, 1299 mi. n. of New Orleans, 410 mi. n. w. of Chicago, 1340 mi. from New York and 1823 mi. east of Seattle, and on the Great Northern, the Northern Pacific, the Saint Paul & Duluth, the Chicago & Northwestern, the Chicago, Milwaukee & Saint Paul, the Wisconsin Central and other railroads. The area of the city is about 55 square miles. Saint Paul proper is confined to the east bank of the river, really the north bank, since opposite the city the Mississippi flows in a slightly northeast direction. The portions across the river belong to the municipalities of West Saint Paul and South Saint Paul, though these are usually considered when speaking of Saint Paul as a whole. The city occupies a beautiful site, on bluffs which rise from the river in a series of terraces. Lying on the lowest level next to the river are found the railway yards, the wharves, the union depot and most of the wholesale houses; the second level is devoted almost entirely to the retail trade, the hotels and some of the public buildings, while the highest level is occupied by residences. The city is admirably laid out, the streets being broad and nearly all of them well paved. In the residential sections they are ornamented by shade trees and lawns. Several bridges for carriages and foot passengers and a number of railway bridges cross the Mississippi at this point.

The park system of Saint Paul includes over 1000 acres and about 48 parks, large and small. Of these the most important are Como Park, Phalen Park and Indian Mound Park. Como and Phalen have beautiful lakes connected with them, and Indian Mound Park is situated on high bluffs in the southeast part of the city, from which the finest view of the river can be obtained. It is so named because it contains several mounds, supposed to have been constructed by the indians. Adjoining this park is the state fish hatchery. Fort Snelling, farther up the river, is practically a part of the Saint Paul park system. The driveways through the various parks and boulevards exceed 20 miles, and the boulevard along the river, a part of which is already constructed, will, when completed, add very materially to the park and boulevard system of the city. Adjoining the city on the north are the grounds of the Minnesota Agricultural Society, containing one of the best race tracks and some of the finest exhibition buildings in the country.

The city has a number of public buildings worthy of note. Chief among these is the state capitol, occupying an eminence on the north side. This is built of Georgia marble, with Minnesota granite for its foundation and steps, and is one of the finest buildings in the United States. Its large white dome is visible from almost any point of approach to the city. The interior is finished in marble and other varieties of costly stone, some of which was imported from central Africa. The cost of the building was about $4,500,000. Next to the capitol in importance is the Federal building, constructed of a pinkish-gray stone. The city hall is also a magnificent structure. Among the business blocks the Globe, the Germania, the Pioneer Press, the Endicott Arcade, the Manhattan and the German-American Bank buildings are especially noticeable. The union depot, while not a pretentious structure, is remarkable for its convenient arrangements for handling its extensive traffic. The Ryan Hotel is one of the finest buildings in the city, as well as one of the most noted hotels in the Mississippi Valley. Among the churches worthy of mention are the People's Church, with a seating capacity of about 2500; the Catholic Cathedral, the Central Presbyterian, the Park Congregational and the First Baptist churches.

The city contains its full share of charitable and similar institutions. Among these are several orphan asylums, a children's home and a public hospital, as well as a number of hospitals maintained by private organizations. Among the educational institutions in or near the city are Hamline University at Hamline, Macalester College, the College of Saint Thomas, Saint Paul Seminary, Concordia College, Saint Paul's College and several institutions of lesser importance. The state agricultural college and experiment station is located at Saint Anthony Park. The city has a public library of over 60,000 volumes, and in addition to this there is a state law library of 30,000 volumes and the library of the state historical society, with 70,000 volumes. Each of these is open to the public without charge.

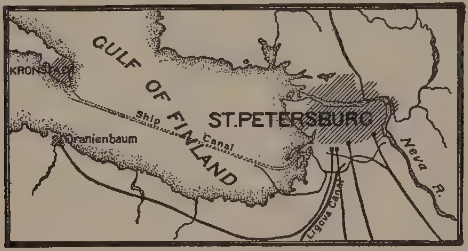
Situated at the head of navigation on the Mississippi, Saint Paul early became the distributing center for the Northwest, and it has continued to maintain its prestige in this respect. It is now one of the great railway centers of the country, and here the passenger and freight traffic to the Dakotas and the great states beyond is transshipped to the railway lines extending to the Pacific coast. This has developed a large wholesale trade, as well as considerable manufacturing. The leading industrial plants include manufactories of furniture, stoves and clothing and works for the construction and repair of railway cars. At South Saint Paul are located the union stockyards, which are one of the important points for slaughtering and meat packing. There are also many other small manufactures, embracing a wide range of industries. The city has an excellent system of electric cars, by which it is joined to Minneapolis, the street railways of the two cities being under one management.

The indian name of Saint Paul was Innijiska, which means *the white rock*. The first white settlers were French traders, who located an outpost here for trading with the indians. It is supposed that this settlement dates from 1658. The present name dates from 1841, when Father Gaultier erected a log chapel at the corner of Third and Minnesota streets and named it Saint Paul's Chapel. From the time that the land in the Northwest was thrown open to settlement, the city continued to grow. Saint Paul has been remarkably free from disasters by fire, flood or disease, and its growth has been steady and conservative. Population of the municipality, in 1904, 197,023; including South and West Saint Paul, estimated at over 200,000.

Saint Paul de Loanda, *lo ahn'da,* the chief city and the capital of the Portuguese colony of Angola, in western Africa. It has a large harbor, the entrance of which has been blocked by sandbars. The city was formerly the center of the slave trade between Africa and Brazil, and is a very old settlement. In the seventeenth century it was famous for its fine churches and monasteries. Among the exports are ivory, coffee, rubber, hides and palm oil. A railway connects it with Ambaca. Population, 20,116.

Saint Pe'tersburg, the capital of the Russian Empire, situated on the Neva, where it enters the Gulf of Finland, 400 mi. n. w. of Moscow. Before entering the gulf, the Neva divides into several arms, forming a delta, most of which is within the city limits. The main branch, known as the Great Neva, divides the city into two main divisions, the Petersburg side and the Great side, which lies on the mainland to the south. This section and the numerous islands occupied by the city are connected by over 120 bridges, some of which are supported on pontoons, so that they can be removed during the winter.

The city is built upon low land which is subject to overflow, and much of this is protected by walls and by the construction of canals, which receive the surplus water. The great city is divided into four quarters, the most important of which is the admiralty quarter, on the south bank of the river and in the center of the city. This quarter is so named from the admiralty building, a structure about 1600 feet long, which contains the admiralty offices and a museum. From this square the four principal streets of the city radiate. Of these the Nevski Prospekt is the finest and is considered one of the finest streets of Europe. It is 130 feet wide and about 4 miles long. It is planted with shade trees on both sides and contains the most beautiful palaces, some of the principal churches and the finest warehouses of the city.



On the southeast of the admiralty building are the Alexander Gardens, and on the southwest is Peter Square, containing a colossal equestrian statue of Peter the Great; beyond this square are the buildings of the senate and the Holy Synod. To the southwest of the admiralty is the Cathedral of Saint Isaac, the most celebrated cathedral of the city. It is built in the form of a Greek cross and is surmounted by a large gilded dome. The porticoes are single pillars of polished granite, over 50 feet high. To the northeast of the admiralty extend the palaces, the most famous of which is the Winter Palace of the czar, the largest, and in many respects the most celebrated, royal palace in the world. This building contains numerous halls, with valuable paintings and museums of antiquities, and in addition to this it has accommodations for over 6000 people. Adjoining the Winter Palace is the Hermitage, which contains one of the finest art galleries in Europe; beyond this is the Marble Palace. In Palace Square, to the southeast of the Winter Palace, is the Alexander Column, a monument nearly 100 feet high, erected to Alexander I.

One of the islands is occupied by the old Fortress of Saints Peter and Paul, which was the original nucleus of the capital and is now used as a city prison. Within this enclosure is also the Cathedral of Saints Peter and Paul, in which the czars and other members of the royal families are buried. Another island is occupied by the University of Saint Petersburg and other prominent educational institutions, while a third is the site of a fine botanical garden. The remaining islands are occupied by parks and residences of the nobility.

Saint Petersburg is the literary and intellectual center of Russia and contains a number of higher institutions of learning. Chief among these is the University of Saint Petersburg. Others worthy of note are the Academy of Sciences, with a library of over 500,000 volumes; the observatory of Poltovna, at Vilna; the Institute of Technology, which is an industrial school; the Conservatory of Music, founded by Rubinstein, and numerous schools for the higher education of women, as well as technical schools in medicine and the various branches of natural science. The Imperial Public Library contains over 1,300,000 volumes and nearly 40,000 manuscripts and is exceeded only by the British Museum and the Bibliothèque Nationale at Paris.

Saint Petersburg is a great commercial and industrial center, and notwithstanding the fact that its port is closed by ice during several months of the year, its exports and imports are extensive. The industrial portion of the city is located on the Petersburg side, where are found most of the large factories and the residences of the workmen. The leading industries are the manufacture of textiles, india rubber goods, tobacco products, leather, machinery and various stone products. The city is the eastern terminus of the trans-Siberian and other important trunk lines of railroad for the Empire.

The fort erected by the Swedes at the mouth of the Neva was captured by Peter the Great in 1703, and he immediately decided to make this the site of the capital of the Empire. By 1712 he was enabled to remove the government to the new capital, and from that time the city increased in population and importance, until now it has become one of the most distinguished capitals of Europe. Saint Petersburg differs from other Russian cities in having the fashionable quarters regularly laid out and the streets faced by buildings which are alined with military precision. Most of the large structures are built of gray stone, so that the city is devoid of all contrasts in color, in which respect it is different from Moscow and other Russian cities. Aside from the fashionable quarter, the streets present a dreary, monotonous appearance and are lined with wooden buildings of inferior structure. Population in 1902, 1,487,720.

Saint Peter's Church, the largest and one of the most magnificent churches in Christendom, located at Rome. It is a cruciform building, in the Italian style, surmounted by a lofty dome, built on the site where Saint Peter is said to have been buried and where many Christians suffered martyrdom under the pagan emperors. In 306 Constantine the Great erected on this spot a basilica of great magnificence. During the residence of the popes at Avignon (1309–1376) it threatened to fall into ruins, and Nicholas V determined on its reconstruction; but the work of restoration proceeded slowly, and Julius II (1503–1513) decided on the erection of an entirely new building. He laid the foundation stone of the new cathedral in 1506 and selected the famous Bramante as his architect. After the latter's death various architects had charge of the work until the appointment, in 1546, of Michelangelo, who nearly completed the dome and a large portion of the building before his decease (1564). The nave was finished in 1612, the façade and portico in 1614, and the church was dedicated by Urban VIII in 1626. The extensive colonnade, which surrounds the piazza and forms a magnificent approach to the church, is supported by 264 columns, 48 feet high, in four rows. The piazza is oval in form and is adorned with an obelisk over 80 feet high, of red granite brought from Egypt in the reign of Caligula, and by two magnificent fountains, the finest in Rome. The height of the dome from the floor is 435 feet, and the exterior diameter is 195 feet. From the dome, which can easily be ascended, an idea of the enormous size can be obtained. The length of the cathedral within the walls is 613 feet, the width 87 feet. The magnificent canopy over the lofty altar does not look large, yet it is 95 feet high. Near this canopy is the famous bronze statue of Saint Peter, seated in a chair, with right foot extended. Devout Catholics kiss the much-worn foot reverentially, on their visits to the church. The floor of the cathedral covers nearly five acres, and the cost is estimated to have exceeded $50,000,000. The whole interior is elaborately decorated with many-colored marble columns, a few costly paintings, numerous fine mosaics, marble statuary and monuments, and it forms a valuable museum of architecture and sculpture.

Saint Pierre, *saN pe air′*, a small island 15 miles south of Newfoundland. The surface is rocky and the vegetation scanty. This island, together with Miquelon Island, constitutes the only territory of all that was acquired by France in the New World previous to the war of 1755-1763, remaining in her hands. The combined population of the group is about 12,300. The inhabitants are engaged in fishing.

Saint-Pierre, Jacques Henri Bernardin de (1737–1814), a French author. He learned engineering, and in the capacity of engineer he worked in Malta, Russia, Germany and for about three years for the French government in Ile de France. On his return to France he devoted himself to literature. His *Studies of Nature,* published in 1783, first secured him a literary position. Then followed his chief works, *Paul and Virginia* and *The Indian Cottage,* both of which were very popular. *Paul and Virginia,* indeed, became one of the most celebrated books of the age and was translated into many languages.

Saint Quentin, *kahN taN′*, a city of France, situated on the River Somme, 87 mi. n. e. of Paris. It was formerly an important frontier post between France and the Low Countries. The buildings of note are the church, dating from the twelfth century, the Hotel de Ville, the palace of justice and the museum. The industries include the manufacture of cotton and woolen goods. The city is noted for two important battles, that in 1557, in which the French were defeated by the Spaniards under Philip II, and that of Jan. 19, 1871, in which the town was captured by the Germans. Population in 1901, 50,278.

Saint-Saens, *saN sahN′*, Charles Camille (1835–), a distinguished French musician. He studied in Paris at the conservatory and won several prizes for his compositions. Later he held several important positions as organist in Paris churches, but abandoned this employment to devote himself to composition and concert. His works include important compositions for orchestra, organ, piano and chorus, besides several oratorios and operas, of which *Samson and Delilah* is perhaps the best known.

Saint-Simon, *saN se mohN′*, Claude Henri, Count de (1760–1825), a French socialist. At the age of eighteen he entered the army and served in the closing campaigns of the American war. He took no active part in the French Revolution, which, indeed, caused him the loss of his own property; but he speculated in the confiscated estates of the nobility and clergy and realized a considerable fortune, which he spent in little more than a year. He had conceived the idea that it was his duty to regenerate humanity, and in order to qualify himself for this great task he engaged in extensive studies and traveled in England and Germany. During the years from 1803 to 1813, he wrote a number of works on scientific and political subjects, in which may be traced the gradual development of his socialistic theories, which found more definite expression in his subsequent and more important writings, such as *Industry* and *The Industrial System.* Finding the difficulty of procuring the means of subsistence and of publishing his works increasing, he attempted suicide by shooting, but recovered with a mutilated visage and the loss of an eye. Saint-Simonianism, as his disciples called the school founded on his principles, demands that the law of inheritance be abolished and that property be distributed according to individual merit.

Saint-Simon, Louis de Rouvroy, Duke de (1675–1755), a French writer. He possessed the esteem of Louis XIV and of the duke of Orleans, but his spirit of independence, severe morality, and peculiar views about the mission of the aristocracy made him unpopular at the court. Nevertheless, he succeeded in getting himself well informed about all the court cabals and the doings and sayings of almost every notable personage of the France of the period. This information he preserved in his *Mémoires,* published posthumously, considered the greatest memoirs ever written. The first complete edition appeared in Paris in 1830.

Saint Thomas, one of the West India islands of the Virgin group, situated 36 mi. e. of Porto Rico. It has an area of 23 square miles and a population of 14,400. The capital, Charlotte Amelia, is on the south side of the island and has a safe and commodious harbor. The United States has made several attempts to purchase this island, but has never succeeded in doing so. It is a possession of Denmark.

Saint Thomas, a city of Elgin co., Ontario, situated 16 mi. s. of London, on the Canadian Pacific, the Grand Trunk, the Michigan Central and other railroads. It has important manufacturing industries and is noted for the construction of cars and car wheels. Population in 1909, 15,000.

Saint Vincent, *vin'sent,* one of the islands in the British West Indian colony known as Windward Islands, situated about 25 mi. s. of Saint Lucia. Its area is 132 square miles, and the population in 1901 was 44,500, most of whom were negroes. The island is of volcanic origin and has suffered from the eruptions of La Souffrière, which is about 3000 feet high. The capital is Kingstown, on the bay of the same name, near the southwest extremity of the island.

Saint Vi'tus's Dance, the popular name for chorea, a disease in which the muscles of the extremities and other parts of the body are thrown into various involuntary motions and perform in an irregular manner those motions which are dictated by the will. Chorea is especially a disease of childhood, occurring in those who are weak or improperly nourished. It generally appears from the eighth to the fourteenth year and is not infrequently very severe, though in the United States few cases are fatal. It arises from nervous disorders.

Sakhalin, *sah ka lyeen'.* See Saghalien.

Sala, *sah'la,* George Augustus (1828–1895), an English journalist and author. His father was an Italian, and his mother an actress and singer of West Indian extraction. He studied art, but early turned to literature. As correspondent for the London *Daily Telegraph* he was in the United States during the latter part of the Civil War, and he served as correspondent for the same paper in many other countries. His principal works are *Twice Round the Clock, The Hours of the Day and Night in London, Seven Sons of Mammon, My Diary in America in the Midst of War, From Waterloo to the Peninsula* and *Cookery in Its Historical Aspects.*

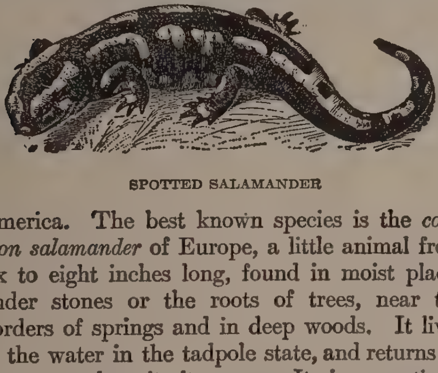
Sal'adin (1137–1193), a celebrated sultan of Egypt and Syria. He early distinguished himself as a soldier, became vizier to the last of the Fatimite caliphs and on the caliph's death usurped his wealth and authority. He rapidly extended his conquests over the neighboring countries, and he thus came in contact with the Crusaders, during the Third Crusade. In 1187 he gained the famous victory of Tiberias, and Jerusalem surrendered to him after a gallant resistance. But the fall of Acre in 1191, after a two years' siege, and defeats at the hand of Richard I of England compelled Saladin to conclude a truce, which was followed by the withdrawal of Richard. About a year after this event Saladin died at Damascus. He was a skilful, brave and magnanimous general and was a wise, beneficent and merciful ruler.

Salado, *sa lah'do,* a river of the Argentine Republic, which rises on the eastern slopes of the Cordilleras and falls into the Paraná, after a southeasterly course of 1000 miles. In its upper course it is called the Pasage and the Valbuena.

Salamanca, *sah'la mahn'ka,* one of the oldest cities of Spain, situated on the Tormes River, 120 mi. n. w. of Madrid. The town occupies a site partially enclosed by three hills and has a striking and picturesque appearance, being surpassed in this by no other Spanish city. The noted buildings are the cathedral, dating from the sixteenth century; the old cathedral, erected early in the twelfth century; the churches of San Martin and San Estaban, and the House of Shells, so named because of the shells used in its decoration. The University of Salamanca was founded early in the thirteenth century, and during the Middle Ages it was one of the leading universities of Europe. It was at Salamanca that the Anglo-Portuguese army under Wellington gained the victory over the French on July 22, 1812. Population in 1900, 25,690.

Sal′aman′ca, N. Y., a village in Cattaraugus co., on the Allegheny River and on the Pennsylvania, the Buffalo, Rochester & Pittsburg, the Erie and other railroads. Gloves and cotton goods are manufactured in considerable quantities, and the lumbering interests are extensive. The Augustinian fathers made a settlement on the spot in 1616. Population in 1905, 5455.

Sal′aman′der, the name given to a small, tailed amphibian, found in Europe and in North America. The best known species is the *common salamander* of Europe, a little animal from six to eight inches long, found in moist places under stones or the roots of trees, near the borders of springs and in deep woods. It lives in the water in the tadpole state, and returns to water to deposit its eggs. It is sometimes called the *spotted salamander*, from the bright yellow spots on its sides. Another species is the *black salamander*, found in the Alps and neighboring regions. Salamanders feed on worms, slugs, snails and insects. The old legend that salamanders could live in the midst of fire is, like their venomousness, a fiction, although it is possible that the watery secretion of the skin might enable them to resist heat. See Newt.



SPOTTED SALAMANDER

Sal′amis or **Kuluri,** an island of Greece, situated in the Gulf of Aegina, near the shore f Attica. It has a rocky surface, but a fertile oil, and in some parts it is well adapted to raising olives and grapes. The area is about 36 square miles. This island is noted for the celebrated Battle of Salamis, fought here in 480 B. C., in which the Persian fleet under Xerxes was defeated by the Grecian fleet. The chief town is Salamis, or Kuluri, with a population of about 4000.

Sal Ammo′niac, the chloride of ammonium, now generally obtained from the refuse of gas works. It is used in calico-printing, in galvanizing iron, in soldering, in batteries and to a considerable extent in medicine.

Salayer, *sa li′ur,* **Islands** or **Saleyer Islands,** a group of islands in the Indian Ocean, south of the Celebes, forming a part of the Dutch East Indian possessions. The group consists of the islands of Salayer, or Great Salayer, Kalaura, Boneratta, Hog Island, the Boegerones and several small islands, in all numbering about 30. Salayer Island, the largest, is about 35 miles long. The inhabitants are Malays and number about 50,000, nearly all of whom are Mohammedans. The chief products are ebony, teak, indigo, coffee, cotton and tobacco. Race horses, for which the islands are especially noted, are raised in large numbers.

Sa′lem, Mass., the county-seat of Essex co., 16 mi. n. e. of Boston, on Massachusetts Bay, and on the Boston & Maine railroad. The place was first settled by Roger Conant and his associates in 1626 and is, next to Plymouth, the oldest town in Massachusetts. About 1692 the witchcraft delusion appeared in this district (See Witchcraft). The town was intimately associated with many events of colonial history and contains a number of quaint old houses and irregular streets. It was the birthplace and early home of Nathaniel Hawthorne and the scene of some of the labors of Roger Williams. For many years after the Revolution, Salem was an important commercial center, and her merchants had almost a monopoly of the East Indian and China trade. The harbor, however, was not of sufficient depth, and business began to decline and the foreign trade to be transferred to Boston and New York, about the time of the War of 1812. There is yet a considerable coastwise trade. The industrial establishments now include a large cotton mill, tanneries, a lead factory, chemical works and other factories. Some of the prominent buildings are the Peabody Academy of Sciences, containing large ethnological and natural history collections; the Essex Institute, with its valuable library and historical relics; Salem Athenaeum; the public library; the city hall, and the courthouse.

There are also several charitable homes for orphans and for the aged of both sexes. The city contains a state normal school, a commercial college, two private secondary schools and good elementary and high schools. Consult Powell's *Historic Towns of New England.* Population in 1905, 37,627.

Salem, N. J., the county-seat of Salem co., about 35 mi. s. w. of Philadelphia, on Salem Creek, near the Delaware River, and on the West Jersey & Sea Shore railroad. It was first settled in 1641 and was held successively by the Swedes, the Dutch and the English, before it was bought by the Quakers in 1674. It has regular steamship connection with Philadelphia and conducts a large trade with the surrounding agricultural region. There are canneries, iron foundries, glass works, flour mills and other factories. The city has a public library and a Friends' preparatory school. Population in 1905, 6443.

Salem, OHIO, a city in Columbiana co., about 65 mi. s. e. of Cleveland, on the Pensylvania and the Pittsburg Lisbon & Western railroads. It is in a rich agricultural and stock-raising region, containing deposits of coal. There are engine works, machine shops and manufactories of pumps, stoves, furniture, church organs, brick and other articles. The city has two national banks, a public library and a high school. It was settled in 1807 and was chartered as a city in 1887. Population in 1900, 7582.

Salem, ORE., the capital of the state and the county-seat of Marion co., about 45 mi. s. of Portland, on the Willamette River and on the Southern Pacific railway. The city has a pleasant location, on ground rising gradually from the river, and the streets are wide and beautifully shaded. The state capitol is a large, handsome structure, with a high dome. Other prominent buildings are the city hall, the courthouse, the state penitentiary, the Federal building, an asylum for the insane and the opera house. Willamette University is located here, and the city also has the Academy of the Sacred Heart, an Indian training school, a business college, schools for deaf-mutes and the blind, and the state reform school. There are state, Masonic and Odd Fellows' libraries. The surrounding country produces fruit, hops and wheat, and the city has manufactures of woolens, flour, foundry and lumber products, machinery and other articles. Salem was laid out in 1844, near the site of a Methodist mission. It was chartered as a city in 1853 and was made the capital by popular vote in 1864. Population in 1900, 4258.

Salem Witchcraft. See WITCHCRAFT.

Salerno, *sa lur'no,* a seaport of Italy, situated on the Gulf of Salerno, 30 mi. s. e. of Naples. The town occupies a beautiful site on the slope of a hill. It contains many old buildings, and its streets are winding and narrow, giving the city an ancient aspect. The chief edifice is the Cathedral of San Matteo. On the height above the town are the remains of an old castle, and there is also an atrium, surrounded by old Greek columns and having bronze doors and frescoes, that are remarkable as works of art. In the Middle Ages Salerno was an important city. Its present industries consist of the manufacture of silk and cotton goods. Population in 1901, 42,722.

Saleyer, *sa li'ur,* **Islands.** See SALAYER ISLANDS.

Sal'ic Law, the code of laws of the Salian Franks. One of the laws in this code excluded women from inheriting certain lands, probably because certain military duties were connected with the holding of those lands. In the fourteenth century females were excluded from the throne of France by the application of this law to the succession to the crown, and it is in this sense that the term *salic law* is commonly used.

Salicylic, *sal'e sil'ik,* **Acid,** an organic acid, of a sweetish-sour taste, without smell, possessing great antiseptic and anti-putrefactive properties. It occurs in nature in the flowers of the meadowsweet and in the whortleberry; but that preferred by the medical profession is made from the oil of the wintergreen. There are now several processes for manufacturing salicylic acid on a large scale, and it forms an important article of commerce. Having properties similar to those of quinine, it is given in acute and chronic rheumatism, is used as a lotion in irritation of the skin and is used medicinally in many other ways. A salt prepared from it, salicylate of sodium, is preferred in some conditions, but it does not have the antiseptic qualities of the acid.

Salina, *sa le'na,* KAN., the county-seat of Saline co., about 100 mi. w. of Topeka, on the Smoky Hill River and on the Union Pacific, the Missouri Pacific, the Chicago, Rock Island & Pacific and other railroads. The city is in a fertile agricultural region and is an important commercial center. It contains large grain elevators, flour mills, a brick plant, ice works, a foundry and other establishments. The Kansas Wesleyan University is located here, and the city also has a military academy, a normal school, a business college and a school of oratory. The Masonic Temple is one of the most prominent buildings. Salina was settled about 1860 and was chartered as a city in 1870. Population in 1905, 7829.

Salisbury, *sawlz'ber e,* N. C., the county-seat of Rowan co., 118 mi. w. of Raleigh, on the Southern railway. The city is in a farming and fruit-growing region and contains railroad shops, cotton mills, hosiery works, knitting mills and wooden ware and other factories. Livingstone College, the state normal school for colored students and several secondary schools are located here. The national cemetery contains the graves of more than 12,000 unknown dead. During the Civil War, the city was the seat of a Confederate military prison. The place was settled by English churchmen from Salisbury, England, and was chartered in 1770. Population in 1900, 6277.

Salisbury, Robert Arthur Talbot Gascoyne-Cecil, Third Marquis of (1830–1903), an English statesman. He was educated at Eton and Oxford and entered Parliament in 1853. He advanced gradually until in 1866, on the formation of Lord Derby's third administration, he was appointed secretary of state for India. The following year he resigned that office, but resumed it in the Disraeli government of 1874. He took part in the conference of Constantinople, which was expected to settle the dispute between Russia and Turkey; and at the end of that war, having become foreign minister, he insisted that the treaty which Russia had forced from Turkey be submitted to a congress of the powers. In 1878 he accompanied Disraeli to the congress at Berlin, and on the death of that statesman he became the recognized leader of the Conservative party. He became premier, as well as foreign secretary, on the fall of the Gladstone government in 1885. In 1892, the majority in Parliament being in favor of a Home Rule bill for Ireland, Salisbury retired from office. He was reappointed in 1895, retiring in 1902.

Sali'va, the transparent watery fluid secreted by glands connected with the mouth. The quantity secreted in twenty-four hours varies in the individual and with the character of the food, but it is probably from one to three pints. Saliva keeps the mouth moist, and by mixing with the food during mastication makes of it a soft, pulpy mass, that is easily swallowed. It also changes the starchy elements into some kind of sugar. The salivary glands are the *parotid,* on the sides of the throat; the *sub-maxillary,* under the lower jaw; the *sub-lingual,* under the tongue, and numerous smaller ones, with separate ducts, which are scattered thickly beneath the mucous membrane of the lips, cheeks, soft palate and root of the tongue. Salivary glands are absent in some mammals and reptiles and in most fishes.

Sal'lust (86–34 B. C.), in full, Gaius Sallustius Crispus, a Roman historian. He became tribune in 52 B. C., and in the civil war he sided with Caesar. In 47 B. C. he was praetor elect, and in the following year he accompanied Caesar to the African war, where he was left as governor of Numidia. He returned with immense wealth, was accused of maladministration and oppression, but was never brought to trial. In the luxurious retirement of his later years he wrote his histories, the *Bellum Catilinarium,* a history of the Catiline conspiracy, and the *Jugurtha,* or *Bellum Jugurthinum,* a history of the war against Jugurtha, king of Numidia. These works are valuable rather for their literary excellence than for historical accuracy.

SALMON

Salmon, *sam'un,* a well-known fish, inhabiting both salt and fresh waters; it takes prominent rank among the food fishes of the United States and other countries. It generally attains a length of from three to four feet and an average weight of from twelve to thirty pounds, but these limits of size and weight are frequently exceeded. The typical color of the adult fish is a steel blue on the back and head, becoming lighter on the sides and belly. Teeth are present in the upper and lower jaws, palate and roof of the mouth; the edges of the tongue are also toothed or notched. The food consists of animal matter and must vary with the change of habitat from salt to fresh water.

In the autumn the salmon quits the sea and ascends the rivers for the purpose of spawning. It often has to surmount considerable obstacles, such as falls of some height, in its progress, and it has been known to spring fourteen feet out of the water and to describe a curve of twenty feet. In many streams the salmon are now assisted in this by artificial structures, known as *salmon ladders.* The eggs are deposited in a shallow trough or groove, excavated in the gravelly bed of the river. In from seventy to one hundred fifty days, the young fish emerges from the egg, and in its embryo state it is not unlike a tadpole, being on the average about one and a quarter inches in length. It usually continues in the shallows of its native stream for two years after hatching, and during this period it attains a length of eight inches.

When the season of its migration arrives, generally between March and June, the fins have become darker and the fish has assumed a silvery hue. It is now known as a *smolt*, or *salmon fry*. The smolts now congregate into shoals and proceed leisurely seaward. On reaching the estuary they remain in its brackish water for a short time and then make for the open sea. Leaving its native river as a fish weighing, possibly, not more than two ounces, the smolt, after three months' absence, may return to fresh water as a grilse, weighing four or five pounds. In the grilse stage, the fish is capable of depositing eggs. After spawning in the fresh water, the grilse again seeks the sea in the autumn, and when its second stay in the ocean is over it returns after a few months' absence as the adult salmon, weighing from eight to ten pounds. The salmon returns as a rule to the river in which it passed its earlier existence.

What is known as the *land-locked* salmon, which is found in Norway, Sweden, Maine and New Brunswick, and is so called because it remains in inland waters and does not descend to the sea, is by some regarded as a distinct species from the common salmon. In the waters of northwestern America are several salmon belonging to a distinct genus, including the quinnat, or king salmon; the blue-black salmon, or red fish; the silver salmon; the dog salmon and the hump-back salmon. The quinnat has an average weight of twenty-two pounds, but sometimes reaches one hundred pounds. Both it and the blue-black salmon are caught in immense numbers in the Columbia, Sacramento and the Frazer rivers, especially in spring, and are preserved by canning. The flesh of these salmon is indistinguishable from that of the common form. The salmon is one of the fishes that are important objects of fish culture, and various species of the family have been introduced into waters not previously inhabited by them. Salmon fishing in the Columbia and the Frazer rivers and around Kadiak Island, Alaska, is an important industry. The fish are taken in the spring, when they come inland, nets, traps and wheels with buckets on their circumference being employed for the purpose. The flesh is p served by canning and is shipped to all parts the world. The annual catch is valued at abo $20,000,000.

Salmon Trout, *trowt,* in Europe, a species o trout which ranks next to the salmon itself in value. Like the common salmon, it lives in the sea and ascends rivers to spawn. In the United States the name is given to a large, fresh-water trout, common in the rivers flowing into the Pacific. The char is also sometimes called salmon trout. See SALMON; TROUT.

Salol, *sal'ole,* a white powder, used as a medicine and for the purpose of testing the digestive power of the stomach. It is often mixed with phenacetine and given to relieve pain, and it serves as a disinfectant in intestinal diseases.

Salon, *sa lohN',* THE PARIS, an exhibition of works of art, held annually in May and June in the Palais de l'Industrie, at Paris. Artists from all over the world may send their productions to the jury of experts, which decides on the works which deserve exhibition. Medals and prizes are awarded by the same jury.

Saloniki, *sah lo ne'ke,* or **Salonica,** an important seaport of European Turkey, situated at the head of the Gulf of Saloniki, 140 mi. s. w. of Sofia and 315 mi. w. s. w. of Constantinople. The city rises from the sea in the form of an amphitheater, and when seen at a distance it presents a striking appearance. It contains a mixture of modern structures and old, squalid buildings, bordering on narrow streets. The city contains numerous ruins of ancient and medieval times, among which is a triumphal arch to Constantine. There are also a number of mosques of some interest, that of Saint Sophia being noted for its fine mosaics. The city is on an excellent harbor, protected by a breakwater, and is connected by rail with Belgrade, Sophia, Adrianople and Constantinople. Population, estimated at about 100,000.

Salt, *sawlt,* a substance in common use from the earliest ages, as a seasoner and preserver of food. Chemically it is known as *chloride of sodium*, and in mineralogy, as *halite*. It exists in immense quantities dissolved in sea water and also in the waters of salt springs. Solid deposits of salt, sometimes on the surface, sometimes at greater or less depths, are found also in almost every geological series. Salt manufactured from sea water is produced extensively along the Mediterranean and Atlantic seaboards of Europe, as well as in Utah, California and other parts of the United States. It is chiefly made by natural drying in shallow reservoirs, but also by boiling. Sun-dried salt is the purest. Salt from sea water is usually known as *bay salt.* Most salt, however, is produced from rock salt or from brine springs, the latter being due to the melting of rock salt by water. The salt mines of Wielicza, in Galicia, were worked in the twelfth century, and are the most celebrated in the world. Most countries of Europe, and, in fact, of the world, produce salt abundantly. In the United States salt is found in very productive deposits in New York, Pennsylvania, Kansas, Utah, Ohio, Illinois and several other states. The salt production of the United States in 1902 was about 3,338,890 tons. The most important salt-yielding state is Michigan, whose deposits are of remarkable richness. The wells, which are in the vicinity of Saginaw Bay, seem inexhaustible in supply. Some are over 1,900 feet in depth. Their yield in 1901 was nearly 1,100,000 tons. In the valley of the Mississippi salt springs and wells are numerous. In Louisiana, on an island near New Iberia, is an immense deposit of rock salt of unusual purity; the area of the mass is 144 acres, and the quantity of salt it contains is estimated at 28,600,000 tons. On Virgin River, Nevada, there is a bed of rock salt, extending as a bluff along the river, for over 25 miles; more than 60 per cent of the cliff is salt of great purity. California has abundant salt springs and saline marshes. Salt is used as a glaze for coarse pottery, to harden soaps and for improving the clearness of glass. It is also the source of soda and of chlorine, and it is thus of immense industrial importance.

Saltillo, *sal teel'yo,* a city of Mexico, situated 46 mi. s. w. of Monterey, on the Mexican Central railroad. It is a well-built town and has quite extensive manufactures of cotton goods, blankets, shawls and flour. Near it is the battlefield of Buena Vista. Population in 1900, 23,996.

Salt Lake City, UTAH, the capital of the state and the county-seat of Salt Lake co., situated 12 mi. s. e. of Great Salt Lake and 742 mi. w. of Denver, on the Union Pacific, the Rio Grande Western, the Utah Central and the San Pedro, Los Angeles & Salt Lake railroads. The site is a gently undulating plateau, at the foot of the Wasatch Mountains, with an altitude of 4200 feet above sea level. The city is regularly laid out, with wide, straight streets, and the residential sections are beautified by shade trees, broad lawns and flower gardens about the homes. Most of the paved streets have a small stream of pure water running upon each side, next to the curb, a novel feature seen in no other city. The city centers about Mormon Square, or the Temple Block, which covers an area of about 10 acres and includes the Tabernacle, the Mormon Temple and the Assembly Hall. The Tabernacle is an oval auditorium, 250 feet long, 150 feet wide and 70 feet high, with a seating capacity of nearly 10,000. The roof is supported by arches, and the acoustic properties of the auditorium are such that a person speaking in an ordinary tone of voice can be distinctly heard in any part of the room. At one end are the choir loft and the great organ, considered by many the best instrument of its kind in the United States. The Temple is the most prominent structure in the city. It was nearly forty years in process of erection and cost over $4,000,000. It is of Utah granite, and in its finishings and furnishings the interior is said to be richer than the famous Temple of Solomon. The building is 186 feet long and 99 feet wide, and each end is surmounted by three lofty towers. The highest spire supports a figure of the Mormon angel Moroni. Since its dedication the Temple has been closed to all except Mormons who have lived according to the rules of the Church. It is used for marriages, baptisms and other sacred rites.

In front of the square containing these buildings is a low monument, surmounted by a statue of Brigham Young. The city also contains a number of other small parks of less interest. Chief among the public buildings are the county and city building, which is now used as the state capitol, the Salt Lake City Theater, the state penitentiary and a number of business blocks. The leading charitable institutions are the Holy Cross and Saint Mark's hospitals. The educational institutions include the University of Utah, a state normal school, All Hallows College (Roman Catholic), the Latter Day Saints' College, also schools maintained by the Congregational, Protestant Episcopal and Presbyterian denominations. The public library contains 25,000 volumes. The educational institutions also have valuable libraries. Salt Lake City is in the center of a rich mining region and has a number of large smelters. The other industrial establishments of importance include car shops, boot and shoe factories, foundries and machine shops and lime and cement works. The city is an important distributing point for the surrounding country and has quite an extensive trade. It is the most important city between Denver and the Pacific coast along the line of the Union Pacific and the Rio Grande Western railroads.

Salt Lake City was founded in 1847 by a company of Mormons under the leadership of Brigham Young (See MORMONS). It was organized as a city in 1851 and was given its present name in 1868. After the discovery of gold and silver in the vicinity, Gentiles (those not belonging to the Mormon faith) began to invade the region and settle in the city, and now only about two-thirds of the population are Mormons. Population in 1900, 53,531; in 1905, estimated at 60,000.

Salton Sea, a large body of water in the southern part of California, recently formed by a change in the course of the Colorado River. The sea covers more than 500 square miles of territory in what is known as Imperial Valley, the basin of an old inlet of the Gulf of California, which was shut off from that gulf by a bar formed of the sediment deposited by the Colorado River. In time the waters in this basin evaporated, leaving a fertile area, which succeeding floods from the river have improved, its only defect being the lack of rainfall. About 1900 a plan was undertaken by American capitalists for the irrigation of the district by the waters of the Colorado. The river was tapped by a canal in Mexico. As the basin of Imperial Valley is 200 feet below the surface of the gulf and since the grade of the canal was far steeper than the natural channel of the river, the Colorado sought the lower level by the quickest route and broadened and deepened the irrigating canal until the waters became uncontrollable. Practically the whole volume of the river issued through this opening and spread throughout the valley, destroying property worth millions of dollars and driving thousands of people from their homes. Several attempts, in which the state and the nation have been jointly interested with private capital, have been made to force the river back into its old channel, with partial success.

Saltpetre or **Nitre,** *ni'tur*, a compound known in chemistry as nitrate of potassium, or potassic nitrate. It is produced by the action of microbes in soils containing potash and nitrogenous organic matters, and it appears in a mealy powder upon the surface of the ground in several parts of the world, especially in the East Indies. In some parts of Europe it is prepared artificially from a mixture of common mold, or porous calcareous earth, with animal and vegetable remains containing nitrogen. It is also manufactured on a large scale by crystallization from a hot solution of chloride of potassium and nitrate of soda. It is a colorless salt, with a saline taste, and it crystallizes in six-sided prisms. It is employed in chemistry as an oxidizing agent and in the formation of nitric acid. Its chief use in the arts is in the making of gunpowder, but smaller portions are used in making fireworks and matches. It also enters into the composition of fluxes and is extensively employed in metallurgy. It is used in dyeing, and is much employed in the preservation of meat. In medicine it is often prescribed for its cooling effect in fevers.

Chile saltpetre is sodium nitrate and is found in large, deep beds in Chile and northern Bolivia. See NITRATE.

Salts, SMELLING, a preparation of carbonate of ammonia with some of the sweet-scented volatile oils, used as a restorative for persons suffering from faintness. The pungency of the ammonia is all that is useful, and the oils are added to make it more agreeable. Oils of lavender, lemon, cloves and bergamot are those chiefly used. The celebrated Preston smelling salts are scented with oils of cloves and pimento. The manufacture of ornamental bottles for this preparation is an important branch of the glass and silversmith's trades.

Salvador, *sahl va dor'*, a republic of Central America, bounded on the n. and e. by Honduras, on the n. and w. by Guatemala and on the s. by the Pacific Ocean. The area is 7225 square miles; the coast line is about 200 miles long and deeply indented, so that it contains a number of good harbors, the most important being those of La Union, Libertad and Acajutla. Along the coast there is a low plain about 15 miles wide, but the interior of the country is traversed by mountain groups and has a decidedly wild appearance. A number of the peaks are volcanoes, the highest having an altitude of about 8000 feet. Izalgo has been active almost continuously for more than 100 years. The rivers are few, the most important being the Lempe, which rises in Lake Guijar and flows southeast and forms a part of the boundary between Salvador and Honduras. Other streams worthy of mention are the San Miguel and the Paz. The important lakes are Lake Guijar, about 15 miles long and 5 miles wide, and Lake Ilopango. The climate along the coast and in the valley is hot and in many places unhealthful. but in the interior, among the hills and mountains, it is equable and healthful. There is an abundant rainfall.

The soil is usually fertile, and most of the country is in a state of cultivation. The principal crop is coffee, the annual crop of which amounts to over 55,000,000 pounds. Other important products are cotton, tobacco, sugar cane and rubber. Gold, silver, copper, iron and quicksilver are found, and there are numerous mines in operation. There are no manufactures. A line of railway connects Acajutla, Santa Ana and Libertad, and another connects San Salvador with Santa Ana. Aside from this, inland transportation is by draft or pack animals.

The government is republican in form, the executive consisting of a president and the legislative power being vested in a single chamber. The president is chosen for four years and is assisted by a cabinet of four members. For the purpose of local government the state is divided into fourteen departments. Salvador was formerly a possession of Spain, but it revolted in 1821 and joined the Mexican Confederation. Two years later it withdrew from this confederation and subsequently formed part of the Republic of Central America. In 1853 it became an independent republic. Like other South American states, its progress has been greatly hindered by revolutions, counter-revolutions and by wars with neighboring states. The capital and chief city is San Salvador. The other cities of importance are the seaports of La Libertad and Acajutla. Population in 1902, 1,006,848.

Salva'tion Army, The, a religious and philanthropic organization which was originated in East London as a Christian mission by William Booth, the leader and general, in 1865. The society was developed into its present form and received its name on Christmas, 1878. With the name *army*, came military phraseology. Prayer was called knee-drill; the leader, a general; evangelists, officers (of different grades), and candidates, cadets. A semi-military attire was assumed, and barracks were built. Total abstinence is a condition of membership. The object is to attract people who would not enter church or chapel, and for this cause public houses and prisons are visited and open air meetings are held. The Salvation Army carries on its work in 49 countries and colonies, with 7210 posts under the charge of 16,857 officers, 45,339 local officers and 17,099 brass bands. It publishes 63 periodicals in 24 languages. The weekly journal is the *War Cry*. The Army has a revenue exceeding $3,950,000 per annum. An offshoot of the Salvation Army in America is known as the Volunteers of America. See Volunteers of America.

Salvini, *sal ve'ne*, Tommaso (1829-), an Italian tragedian. He showed early aptitude for the stage, was trained under Modena, a distinguished player, and became well known as a member of Ristori's company. In 1849 he fought with distinction in the war of independence, and at its close he returned to the stage and played with great success in a play written for him by Niccolini and in Alfieri's *Saul*. In Paris he played in these, in Racine's plays and in *Othello*, the part with which he is identified in the minds of English playgoers. He scored successes in Brussels and Madrid and visited the United States in 1874, with as great success. But after another visit to the United States in 1881 and to Great Britain in 1884, he retired from the stage to his villa near Florence. He was one of the greatest of modern actors.

Salwin, *sahl ween'*, a river of southeastern Asia, principally in Burma. It rises in the southeast part of Tibet, flows southward nearly parallel with the Irawadi and falls into the Gulf of Martaban. The towns of Martaban, Moulmein and Amherst are at or near its mouth. The river is about 750 miles long, but is of little service to navigation, because of its numerous rapids and falls. However, vessels of large size can ascend as far as Moulmein.

Salzburg, *zawlts'boorK*, a city of Austria-Hungary, capital of the Province of Salzburg, situated on the Salzach River, 63 mi. e. of Munich and 156 mi. w. s. w. of Vienna. The city is divided by the river into two parts, which are connected by bridges. The older part, containing the main residence section, is on the left bank, and the newer part is on the right bank. The old town has narrow, winding streets, which are lined with flat-roofed houses and are broken at intervals by wide squares. On the summit of a hill is the Castle of Hohen-Salzburg. Among the important buildings are the government buildings, the cathedral and the Franciscan Church, dating from the thirteenth century. The educational institutions include a museum, with a valuable collection of antiquities; a public library and a municipal library, which, combined, have over 115,000 volumes. The city was the birthplace of Mozart and contains a fine bronze statue of him. The industries are unimportant. Population in 1900, 32,934.

Samar, *sah'mar*. See Philippine Islands.

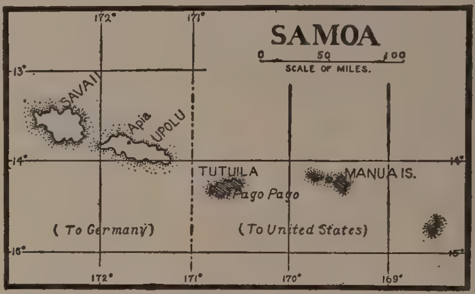
Sama'ria, a city of Palestine. According to the account in *I Kings*, it was built by King

Omri in the ninth century B. C. and was made the capital of the kingdom of Israel. It was well adapted to be the capital, because its location, on a hill which could be approached only from one side, made it well-nigh impregnable. The Assyrians under Sargon took the city about 722 B. C. In the second century B. C. it was entirely destroyed, but it was rebuilt by Herod the Great, who called it Sebaste.

Samar′itans, a mixed people, who inhabited the region between Judea and Galilee and who formed a sect among the Jews. They consisted partly of the tribes of Ephraim and Manasseh, left in Samaria by the king of Assyria when he carried their brethren away captive, and partly of Assyrian colonists. On the return of the Jews from captivity they declined to mix with the Samaritans, though united with them in religion. The latter attempted to prevent the Jews from building the Temple at Jerusalem, and, failing in this, they built a temple on Mount Gerizim, exclusively for their own worship. This temple was destroyed by John Hyrcanus. The Samaritans adhere strictly to the Mosaic law, but are regarded by the Jews as heretics, as they accept only the Pentateuch, of which they have a special version of their own. There are at present about 150 of this sect, all of whom live in and about Nabulus and make an annual pilgrimage to Mount Gerizim for each of the three great festivals.

Samarkand, *sahm′ur kahnd′*, a city of Russian Turkestan, situated on the Transcaspian railway, 130 mi. e. of Bokhara. The city is divided into the native, or old, quarters and the Russian, or modern, quarters. In the native quarters is a large central square. This part of the city has narrow streets and contains a number of mosques and bazaars. The Russian quarter dates from 1871 and is constructed on a more modern plan. The city contains the tomb of Tamerlane, who formerly ruled a vast empire of which Samarkand was the center. The industries include the manufacture of cotton and silk goods, leather goods, gold and silver ware, pottery and wine. The city is of some importance as a commercial center. Population, about 55,000.

Sam′nites, several ancient tribes of Lower Italy, of Sabine stock. They were a brave, frugal and religious people, who were defeated in their first war with the Romans. Three more fierce and bloody wars were necessary before the Romans completely subdued them, and by the close of the struggle the Samnites were almost exterminated.



Samo′a or **Samoan Islands,** also called Navigator's Islands, a group of islands in the Pacific Ocean, situated between 13° 25′ and 14° 30′ south latitude and between 168° and 173° west longitude, about 4200 mi. s. w. of San Francisco. The islands are 14 in number and are of volcanic origin. Of these only Savaii, Upolu and Apolima, belonging to Germany, and Manua and Tutuila, belonging to the United States, are of any importance. The total area of the islands is about 1100 square miles, and their population is about 38,000, of which about 32,500 are in the German possession and 5800 in the American. The islands are decidedly mountainous and contain volcanic cones which rise to over 5500 feet. One of these in Savaii was active in 1902 and 1903. The vegetation is of a tropical nature and is luxuriant. The climate, though hot, is healthful, but the islands are subject to violent hurricanes. One of the most disastrous, in 1889, caused widespread destruction of property and life. The important settlements are Apia, the former capital, on the island of Upolu, and Pago Pago, on Tutuila, which is of special value because of its excellent harbor. Formerly these islands constituted a native kingdom, but jealousy between rival claimants to the throne brought them under the joint protection of Germany and the United States, and by a treaty ratified in 1900 they were divided between these countries as stated above. The people are intelligent, peace-loving and in the main industrious. They are of the Malay race.

Sa′mos, an island situated off the west coast of Asia Minor, 42 mi. s. w. of Smyrna. The length from east to west is 27 miles, and the greatest breadth is 10 miles. The area is about 180 square miles, and the surface is mountainous. The mountains are quite generally covered with forests, but the lowlands and valleys are fertile, and the island is very productive, the chief products being raisins, fruits, mastic, corn, oil and Muscadine wine. The island also contains valuable marble quarries. It is a possession of Turkey.

Samp′son, William Thomas (1840–1902), an American naval officer, born at Palmyra, N. Y. At the age of seventeen he was appointed a midshipman in the United States Naval Academy at Annapolis, graduated at the head of his class in 1861 and was immediately ushered into service. He soon gained a lieutenancy, and in 1866 he was promoted to be lieutenant commander, while on the *Colorado.* From 1868 to 1871 he was instructor at the Naval Academy, and again from 1876 to 1879; and from 1886 to 1890 he was its superintendent. From 1893 to 1897 he was chief of the bureau of ordnance, and had much to do with the building up of the navy. He was president of the *Maine* court of inquiry in March, 1898, and in April he was made acting rear admiral and was given command of the fleet operating in Cuban waters. He commanded the fleet off Santiago until the city surrendered, although at the time of the destruction of Cervera's squadron he was absent. In 1899 he was given the rank of rear admiral. A contest arose between Schley's friends and Sampson's, as to which of the two men deserved the credit for the victory of Santiago, and this embittered the last years of Sampson's life. See Schley, Winfield Scott.

WILLIAM THOMAS SAMPSON

Sam′son, an Israelite of the tribe of Dan, the son of Manoah, and reckoned one of the judges of Israel. He was a popular hero and an inveterate enemy of the Philistines. His peculiar gift of great bodily strength is strikingly shown in the nature of his deeds; he tore in pieces a lion, broke his bonds asunder and carried away the gates of Gaza. Delilah, his concubine, deprived him of his strength for a period by cutting off his hair, which was a violation of his obligation as a Nazarite, but with the growth of his hair his strength returned, and at the great festival of Dagon, Samson pulled down the building over the heads of the Philistines, who had put out his eyes, and he perished with them. Milton has made his death the subject of a drama, *Samson Agonistes.*

Sam′uel, the first of the order of prophets and the last of the judges of Israel. He was the son of Elkanah, belonging to the tribe of Levi, and was consecrated by Hannah, his mother, to the service of Jehovah. He assumed the judgeship of Israel about twenty years after the death of Eli and headed a successful expedition against the Philistines. His administration was distinguished by the restoration of the neglected worship of Jehovah. In his old age Samuel anointed Saul as king, and when Saul failed in his duties Samuel anointed a new king, David. He did not live to see the contest between David and Saul decided.

Samurai, *sah moo ri′*, (Japanese, "guard"), a military caste in Japan during the feudal régime. It included the shogun, or commander in chief, the daimios, or feudal landowners, and the followers or retainers of the latter, besides a part of the middle class. When the feudal system was overthrown in 1871, the daimios and their followers were given pensions, in return for the cession of their lands to the emperor, and the daimios were thereafter known as *nobility,* while all the members of the samurai were given the title of *gentry*.

San Anto'nio, Tex., the largest city of Texas, the county-seat of Bexar co., 80 mi. s. w. of Austin, on the San Antonio River and on the Southern Pacific, the International & Great Northern, the Missouri, Kansas & Texas, the San Antonio & Aransas Pass and other railroads. The city has an altitude of about 650 feet and has a dry, healthful climate. There are, in all, about twenty parks and plazas. Near the city is Fort Sam Houston, covering about 250 acres, which is one of the largest army posts in the United States and is the headquarters of the Department of Texas. San Antonio is a popular resort for tourists and health seekers, especially for those afflicted with pulmonary diseases.

The educational institutions consist of the large Carnegie Library, good public schools and almost thirty private schools and colleges, including the Saint Louis College, Santa Anna Female College, Thomas School, Peacock's School for Boys, Saint Mary's Hall, West Texas Military Academy and Mrs. Mulholland's School for Girls. Among the charitable institutions are the Santa Rosa Hospital, Physicians' and Surgeons' Hospital and the Southwestern Insane Asylum. Other prominent buildings are the courthouse, the city hall, the Federal building, the market house, Convention Hall, San Fernando Cathedral, Saint Mark's Cathedral, Grand Opera House, the Menger, Southern and other hotels, the Hicks building, Alamo National Bank and a number of other business blocks. There is a valuable trade in cotton and live stock. The industrial establishments include large breweries, machine shops, foundries, flour mills, cement works, binderies, cotton presses and other works.

San Antonio was probably first settled in the latter part of the seventeenth century. In 1718 the missions of San Antonio de Valero and of San Antonio de Bexar were founded. In 1731 a colony of people arrived from the Canary Islands. The place was then known as the Villa of San Fernando de Bexar, and this villa was made a city in 1809. The Texan patriot army occupied the place in December, 1835. On the sixth of the next March the famous storming of the Alamo occurred, when the entire garrison were massacred and their bodies burned by the Mexican dictator, Santa Anna. After the decisive victory for the Texans in the Battle of San Jacinto, American pioneers came in greater numbers, and they were followed the next decade by Germans. The first railroad reached the city in 1878, and since then its growth has been rapid. Population in 1900, 53,321; in 1905, estimated at 65,000 Consult Corner's *San Antonio de Bexar*.

San Bernardino, *bur nar de'no,* Cal., the county-seat of San Bernardino co., 63 mi. e. of Los Angeles, on the Atchison, Topeka & Santa Fé, the Southern Pacific and several electric railroads. The city has a beautiful location west of Mount San Bernardino, in a rich mining, agricultural and fruit-growing region. It contains hot water, sulphur and mud baths, has an equable climate and is a popular health resort. A state hospital for the insane is located here, and the city has the Saint Bernardine of Sienna Academy and a business college. The important public buildings are the courthouse, the hall of records, seven churches, the hotels and several banks. The industrial establishments are railroad shops, lumber mills, grain elevators, machine shops and other factories. The place was settled by a company of Mormons in 1851. Population in 1900, 6150.

San Cristobal, *krees'to bal,* a city of Mexico, situated near the central part of the State of Chiapas, in the southeastern part of the country. It is an inland town, in the midst of a fruit-growing region. The manufactures include earthenware and coarse textiles. The city has a cathedral, a seminary and a hospital. Population, about 16,000.

Sand, fine particles of stone, particularly of quartz and feldspar, in a loose state, but not reduced to powder or dust. Most of the sands which we observe are the ruins of disintegrated rocks and differ in color according to the rocks from which they were derived. Valuable metallic ores, as those of gold, platinum, tin, copper, iron and titanium, often occur in the form of sand or mixed with that substance. Pure quartz sands are very valuable for the manufacture of glass, for making mortar, for use as filters, for lightening dense clay soils, for making molds in founding and for many other purposes.

Sand, George (1804–1876), the pen name of a celebrated French novelist, Armantine Lucile Aurore, Baroness Dudevant. Her first literary venture was a novel, written in conjunction with a young lawyer, Jules Sandeau, and published under the pseudonym "Jules Sand." From this she took her own pen name. Her published works comprise over sixty novels, numerous plays and several volumes of memoirs. Among her novels may be mentioned *Consuelo, Monsieur Sylvestre, The Snow Man* and *The Devil's Pool.*

San'dalwood, a tree belonging to the East Indies and the Malayan and Polynesian islands, remarkable for its fragrance. Its wood is used as a perfume and is manufactured into glove boxes and other light articles. It is largely used as incense in worship, by Brahmans and Buddhists. There are several species which furnish sandalwood, the common being the white sandalwood, which comes from the mountains in south India and the islands of the Indian Ocean. Some trees of other genera are called *false sandalwood.*

Sand Blast, a process of cutting or engraving glass or other hard materials. Sand is driven with great force by steam or compressed air through a tube, which is usually narrowed to a nozzle and is held one or two inches above the object to be cut or engraved. Rubber, wax or some other substance upon which the sand will not act is used to cover the parts of the design that are not to be cut. The sand blast is in very common use in glassworks.

Sand Bur or **Bur'grass,** an injurious weed, common in all parts of the United States and in other temperate countries. It grows in sandy regions and is very troublesome to sheep, as the small spiny burs readily cling to the wool. Frequently a great number of these burs imbed themselves so deeply in the hide that they cannot be removed without ruining the skin.

Sand Eel or **Sand Lance,** a genus of fishes. The body is slender and cylindrical, somewhat resembling that of an eel and varying from four inches to about one foot in length. It is of a beautiful, silvery luster, destitute of ventral fins, and its scales are hardly perceptible. These fishes generally swim in large schools near the shore and bury themselves in the sand. The sand eel of America is found from the coast of Labrador to that of New York. It is largely used as a bait for cod.

San'derling, a snipe, resembling the common sandpiper and found throughout the United States, at the North in summer, but at the South in winter. The feathers of its head and neck are gray, edged with lighter color and spotted with brown, and the lower parts are white. These birds are found along the seacoast, especially during the migrating season, running in the surf.

San Diego, *sahn de a'go,* CAL., the county-seat of San Diego co., 125 mi. s. by e. of Los Angeles, on San Diego Bay and on the Atchison, Topeka & Santa Fé, the National City & Otay and other railroads. The city is beautifully located on the large land-locked harbor of the bay, and it has a mild, equable climate. It contains a number of good hotels and is a popular health resort. The remains of the old Spanish mission are of interest, and the Coronado Beach, across the bay, has a large hotel, an ostrich farm, botanical gardens and other attractions. The Federal government also has a coaling station and Fort Rosecrans on the bay. San Diego is a port of entry and has a considerable foreign trade. Oranges, lemons, olives and other fruits are extensively cultivated, and the city contains carriage works, flour mills, furniture factories and manufactories of vinegar, wine, fruit extracts and other goods. A mission was started here in 1796, and the Spanish town was organized in 1835. The place was taken by Commodore Stockton in the name of the United States in 1846. He established a fort, which is still known as Fort Stockton. The present city has grown chiefly since 1867. Population in 1900, 17,700.

Sand'pi'per, a small snipe, of which there are about 30 species, found in all parts of the world. They live on the shores of the sea and on the banks of rivers and spend their time groping in the soft mud for worms and small mollusks, In winter they migrate to the South in flocks changing their plumage with the change of seasons. The voice of sandpipers is shrill and unmusical. The *pectoral sandpiper,* called also the *jacksnipe;* the *purple sandpiper,* and the *spotted sandpiper,* or *teetertail,* are the most common of the species of the United States. For the egg of the spotted sandpiper, see BIRDS, *color plate, Eggs.*

Sandstone, a rock made up of grains of sand, cemented together by some other mineral. The cementing mineral may be limestone, clay, oxide of iron or silica. Sandstone is abundant in many localities. It is found in the valley of the Connecticut River, in northern New York, in sections of Ohio, Michigan and Iowa and in many other places. It varies in color from light gray and bluish-gray to dark brown. That found near Cleveland, Ohio, is gray; that near Potsdam, N. Y., a dark red. Sandstone is used for a variety of purposes. Certain fine-grained sandstone makes excellent grindstones and whetstones. Some varieties are soft when quarried, but harden on exposure to the air. The rock is easily quarried and worked, and forms one of the most valuable building stones. The famous "brown stone fronts," so fashionable in New York and some other cities, are of sandstone.

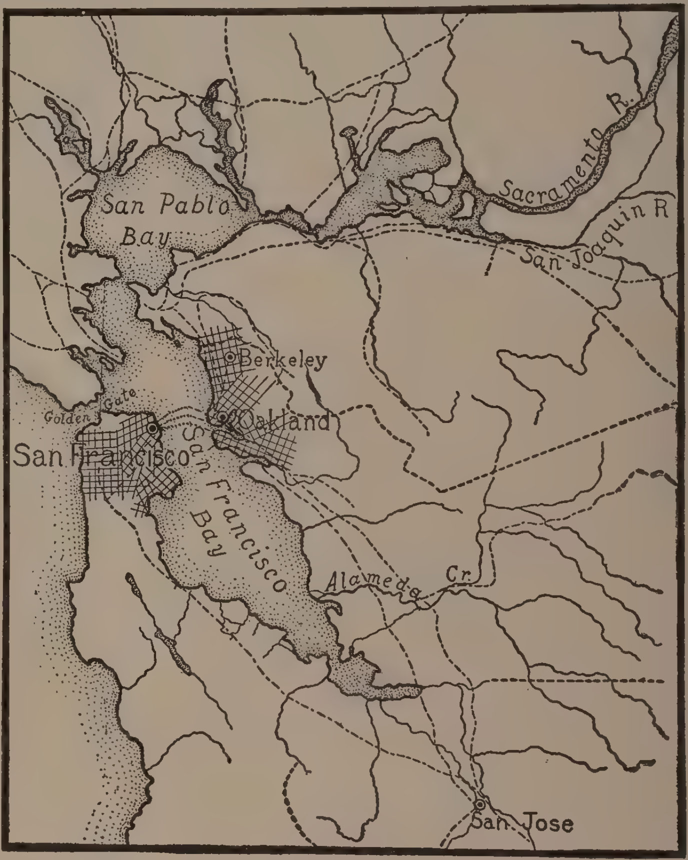
Sandus'ky, OHIO, the county-seat of Erie co., 55 mi. w. of Cleveland, on Lake Erie, at the mouth of the Sandusky River, and on the Lake Shore, the Pennsylvania, the Baltimore & Ohio and other railroads. There are also electric railways to Cleveland and other places. The city has an excellent harbor and a considerable trade with the principal lake ports. The surrounding region is fertile and produces fruits, vegetables and grain. Grapes are extensively cultivated, large quantities of wine are made, and fishing is also an important industry. The principal manufactories are basket and crate works, cooper shops, wagon and carriage factories, shipbuilding yards, machine shops and flour mills. There are also large coal and lumber yards, and considerable iron ore is shipped. The state soldiers' and sailors' home is located here. Some of the prominent structures are the Federal building, the courthouse, the county infirmary, the jail, several large warehouses and a public library. Cedar Point and Put-in-Bay are popular summer resorts, and there are other places near the city which afford good fishing. Sandusky was settled in 1817 and was incorporated as a city in 1845. Population in 1900, 19,664.

Sand'wich Islands. See Hawaii.

Sandy Hill, N. Y., a village in Washington co., on the Hudson River and on the Delaware & Hudson railroad, 40 mi. n. of Troy. The surrounding territory has extensive lumbering and stone-quarrying interests, and Sandy Hill has manufactories of foundry products and lumber. Population in 1905, 5321.

Sandy Hook, a narrow peninsula, which projects northward from the coast of New Jersey and partly encloses New York Bay. It is about six miles long and is low and sandy. Near its northern end are a United States military post, Fort Hancock and a lighthouse.

San Francisco, *san' fran sis' ko,* the chief city of California and the ninth city of the United States, situated on the peninsula between San Francisco Bay and the Pacific Ocean, and extending to the Golden Gate, upon the north. The city is about seven miles square and comprises the county of San Francisco. It is laid out on hills, which are separated by nearly parallel valleys, and presents a most picturesque appearance, whether seen from the ocean or the bay It has broad streets and boulevards and many beautiful trees. The residence section is filled with fine mansions, especially along the high ridge, which is parallel to the bay, extending toward Golden Gate. Along the ocean is a high ridge of sand dunes, which serve to protect the city from the winds. These dunes continue in a series of hills around the city to the south.



Market Street, the chief thoroughfare, extends across the city from the ferry depot, on the bay, to the ocean beach, and it divides the city into two nearly equal portions. South of this is the older part of the town, frequently known as the Mission, because it was in this part that the first settlement, a Spanish mission, was located. The two districts are usually known as *North of Market Street* and *South of Market Street.* The north district contains the chief residence portion and the retail stores of the higher class, while the wholesale houses and manufactories are in the south district.

PARKS. San Francisco has many beautiful parks, the most important of which is Golden Gate Park, containing 1100 acres in a high state of cultivation. The park is in the western part of the city and extends to the ocean. It is covered with almost a tropical growth of trees and flowers and is considered one of the finest parks in the world. It has one of the largest aviaries in the world and an excellent zoölogical collection, besides a museum of art and antiquities. There are also a number of smaller parks.

A fine beach extends along the ocean front and is much used for bathing. At the northern end is the Cliff House, situated on a cliff projecting into the ocean, near the Seal Rocks, famous for the large number of sea lions that visit them.

INSTITUTIONS. San Francisco maintains an excellent system of public schools and many private schools. Chief among the latter are the law and medical colleges affiliated with the University of California; the Cooper Medical College, the San Francisco State Normal School and the College of the Christian Brothers. The free public library, with over 90,000 volumes; the library of the Mechanics' Institute, 75,000 volumes, and the Mercantile Library, 75,000 volumes, which were recently consolidated, and that of the Academy of Sciences, were all destroyed in the fire of April, 1906.

There are a number of orphan asylums and old people's homes, maintained by the various religious denominations of the city; also, a children's hospital, maintained at public expense, an almshouse and a city and county hospital, maintained by the city. The demand for institutions of this sort is not so great in San Francisco as in most other cities of its size, because of the general prosperity of the people.

COMMERCE AND INDUSTRY. San Francisco is the principal seaport of the Pacific coast. Her harbor is one of the best, if not the best, in the world, and throughout the year it contains ships of all nations. The annual foreign trade exceeds $100,000,000 in value. Transcontinental railway lines, which terminate at Oakland and are connected with the city by ferry, also afford ample railway facilities for inland transportation. The city contains a large number of wholesale and commission houses. The manufactories are important and include mills of all kinds. There are also some extensive shipbuilding plants, one employing nearly 5000 men.

HISTORY. San Francisco Bay was discovered by the Franciscan friars in 1718, and a mission was established. Soon after, the Spanish government stationed a small garrison here. There was but little growth in the settlement until after the discovery of gold in 1848. With the influx of people consequent upon this discovery, San Francisco suddenly sprang into prominence and has continued to increase in numbers and commercial importance ever since. An earthquake occurred in San Francisco at 5:16 o'clock on the morning of April 18, 1906, doing considerable damage to badly constructed buildings and breaking the main supply pipe of the water works, where it ran through made ground. The damage done by the earthquake was immaterial, when viewed in comparison with that of the fire which followed. Fires started in several places, and owing to lack of water, they soon got beyond control. In four days, they destroyed more than $500,000,000 worth of property and rendered 200,000 people homeless. Almost 500 city blocks were laid waste. According to official records, 427 people lost their lives.

Preparations were immediately begun for the rebuilding of the city on a finer scale. Committees on water supply and fire department, on condemnation of old buildings, on sewers, hospitals and health, and on extending and widening streets, were at once appointed, and plans were laid with a view to rendering impossible in the future another such destruction by fire. The fact that the steel-frame buildings, the largest of which were the Call building, the highest structure on the Pacific coast, and the Chronicle building, had withstood the shock of the earthquake, showed clearly the type of building which the new city needed.

POPULATION. The population is remarkable for its cosmopolitan character, and like that of New York and Chicago, it contains representatives of almost every nationality in the world. In 1900 it was 342,000. In 1905 it was estimated at 500,000. This was reduced by more than 100,000 after the fire; a majority of those who left, however, announced their intention of returning later. Consult Keeler's *San Francisco and Thereabouts*, published by the California Promotion Committee.

San Francisco or **São Francisco,** a large river of Brazil, rising in the State of Minas

Geraes and flowing north-northeast, then east, separating the State of Bahia from Pernambuco and entering the Atlantic Ocean by two mouths. Its length is 1200 miles. It is navigable for ocean steamers of light draft for 150 miles. Above this, a portion of the course is disturbed by rapids. Above these rapids the stream is again navigable for about 900 miles.

San′he′drin, the chief Jewish tribunal. In the time of Christ it was composed of seventy-one members, including the high priest. Only Israelites well versed in the law and of good character might become members. The council could pronounce sentence of death, but could not execute the sentence without authority from the Romans (*John* XVIII, 31). Jesus was tried before the Sanhedrin, and Peter, Paul, John and Stephen were brought before it.

San′ita′ry Commis′sion, UNITED STATES, the name given to an organization which was formed soon after the opening of the Civil War, for the relief of the sick and wounded soldiers of the Union armies. It consisted of famous surgeons, philanthropists and high army officers, of whom Henry W. Bellows was president, and the famous artist, Frederick Law Olmsted, secretary. The expenses of the commission were borne by popular subscription. Nearly $5,000,000 was subscribed, money being received from every state and from foreign countries. Contributions of supplies, medicines and services to the value of fully $15,000,000 were also made. The principal efforts of the commission were directed to preventing disease among the soldiers, by judicious selection of camp locations and by care for the drainage and cooking. Hospitals for sick and convalescent soldiers were opened, and hospital supplies and other provisions were furnished to the soldiers, even on the field of battle. A trained corps of hospital surgeons and physicians was employed to inspect the service in the field and at military posts, and information of the greatest value was compiled by them.

Sanitary Science, that branch of science which deals with the maintenance of health and the prevention of disease by the regulation of external conditions. It treats especially of what is required of each individual, in his duty to his neighbor, so that by using such means as may insure his own health he may in a negative way preserve that of his neighbor, also. Naturally, the subject divides itself into four main divisions—the first relating to dwellings; the second, to food; the third, to clothing, and the fourth, to personal health.

DWELLINGS. Dwellings should be located on solid, dry earth or on soils that have been properly drained and are pure and clean. "Made land" is often destructive to health (See DRAINAGE). The house should be situated so that a free circulation of air is possible around it, and it should be supplied with a thorough system of sewerage (See SEWAGE AND SEWERAGE). The rooms should be airy and well ventilated. Sewer gases, which enter houses where waste or soil pipes are in direct communication with the main sewer, are exceedingly poisonous. The offensive gas is practically harmless, but its presence indicates the existence of an odorless, poisonous gas. Sunlight and ventilation destroy this gas. In order to prevent its entrance into a house, the waste pipes should be carried along outside a house and furnished with a ventilator, so that the gas may escape into the external air. This ventilator should discharge at the roof of the house and not near to a window or other opening into the building. Poisonous gases and foul odors may arise from the decomposition of organic matter in the house, from the emanations from the body, from arsenic and copper in wall paper and from various other sources. Flowers give off carbonic acid at night, and gas jets pour impurities into the atmosphere. Every portion of a house should be kept scrupulously clean, and after contagious disease there should be thorough cleansing and disinfection of the bedding, carpets and other furniture. A supply of fresh air should be given to sleeping rooms whenever they are in use, and they should be opened and thoroughly ventilated every day.

FOOD. Food should be chosen to suit the individual, and all waste should be removed and destroyed (See GARBAGE). In the choice of foods, care should be taken to purchase nothing that is stale or partially decayed or that has been exposed to the air and dirt of crowded streets. In any case, vegetables and all food products that have been exposed to the air should be thoroughly cleansed before using or cooking. Water, if contaminated by sewage, is a fruitful source of disease; the sources of water supply should be examined frequently, and no water should be used of whose purity there is any doubt (See BACTERIA AND BACTERIOLOGY; TYPHOID FEVER).

CLOTHING. A person should be warmly,

but not too heavily, clad. Woolen worn next the skin is a protection from sudden changes of temperature. Whenever a person goes from a heated room to cold, outside air, he should put on additional clothing, and it is equally necessary that this should be removed when he returns to a heated room. Cleanliness in clothing is of the greatest importance. Underwear should be taken off at night and left where it will be well aired, and it should be changed and washed thoroughly at least once a week. Stockings should not be worn more than two days without washing. Every article of clothing that comes in contact with a person having a contagious disease should be thoroughly disinfected or destroyed, and much suffering would be saved to many innocent people if a physician were consulted and his advice followed implicitly wherever an infectious disease is supposed to exist (See QUARANTINE; GERM THEORY OF DISEASE).

PERSONAL HEALTH. Cleanliness and exercise are the two greatest factors in securing good health. The first duty of every human being is to attend thoroughly to the cleansing of the whole body, for the neglect of this first principle is one of the most prolific causes of disease. The daily use of a cold bath is conducive to best health and is a powerful preventive of disease. Care should be used in taking a bath, that the body be not chilled, and a thorough rubbing should be given the body after the bath, in order to produce the comfortable reaction or glow that is the real tonic (See BATH). Exercise may be taken indoors, but the best exercise is that which a person enjoys in the open air—walking, riding, rowing or in any one of the games which keep the muscles active and promote deep breaths of wholesome air. The exercise which is enjoyed is much better than that which is forced, though the latter is far better than nothing. If a person follows the rules of sanitary science, seeks cheerful society, frees himself from worry and anxiety and abstains from vices, he has a right to expect health and happiness.

San Jacinto, *sahn ja sin'to,* BATTLE OF, a battle in the war for Texan independence, fought near San Jacinto Bay, Texas, April 21, 1836, between a force of Texans, numbering about 700, under General Houston, and a Mexican force of 1400, under General Santa Anna. The engagement was brief but fierce, a determined charge by the Texan force completely overwhelming the Mexicans. This battle was the final engagement of the campaign. Santa Anna was soon after captured, and Texas set up an independent government.

San Joaquin, *hyo a keen',* a river of California, which rises in the Sierra Nevada Mountains, in the southern part of the state, and flows in a northwesterly direction until it joins the Sacramento, just before that stream enters Susuin Bay. Its length is 350 miles, and it is navigable as far as Stockton. The most important tributaries are the Fresno, the Merced, which flows through Yosemite Valley, the Tuolumne and the Stanislaus. The valley of the San Joaquin is one of the most fertile portions of California.

San José, *hyo za',* the capital of the Republic of Costa Rica, situated about 44 mi. e. of Puntarenas, a port of the Pacific, and 68 mi. w. of Limon, on the Atlantic coast. The town is well built, has wide, paved streets and electric lights. The most prominent buildings are the cathedral, the national museum, a school of law, the national library and the Institute of Physical Geography. San José is situated about 3800 feet above sea level, has a healthful climate and a pure water supply and is the center of a rich agricultural region. It was founded in 1738 and was made the capital of the country on the establishing of independence in 1823. Population in 1897, 25,000.

San José, CAL., the county-seat of Santa Clara co., about 50 mi. s. e. of San Francisco, on the Guadalupe River, on the Coyote Creek and on the Southern Pacific railroad. The city is located in the beautiful Santa Clara valley and is a popular health resort. It is the seat of the University of the Pacific, the College of Notre Dame and a state normal school. Other prominent buildings are the city hall, the courthouse, the hall of records, the postoffice and the high school. The city also has two libraries and two public parks. The Lick Observatory is on Mount Hamilton, 18 miles to the east. Alum Park, with its mineral springs, seven miles distant, is also of interest. Large quantities of fruit and grain are raised in the valley, and fruit-packing is one of the most important industries of the city. There are also foundries, fruit canning and drying establishments, marble works and manufactures of wines, liquors and other goods. A Spanish town was founded here in 1777, and the mission of San José was established two years later. United States troops took possession of the place in 1846, and it was the capital of California from 1849 to 1851. Population in 1900, 21,500.

San Juan, *hwahn*, (formerly San Juan de Puerto Rico), the capital and chief city of Porto Rico, situated on a small island on the north coast of Porto Rico and connected with the mainland by a bridge. The city is surrounded by a wall, built two hundred fifty years ago. It has an excellent harbor, is regularly laid out and contains a number of plazas and squares. Since the occupation of the island by the United States, the sanitary conditions have been greatly imimproved. The streets are narrow, the houses are mostly constructed of stone and are of a massive style of architecture. The principal buildings are the city hall, the theater, the military hospital, the Jesuit College and the palaces of the captain-general and the bishop. The city also has a large market place and a number of fine churches. The manufactures are unimportant, but include matches, brooms and soap. The city is the most important commercial center of the island and is also the seat of government. Population in 1899, 32,048.

San Juan, the capital of a province of the same name, in Argentine Republic, situated on the San Juan River, 85 mi. n. of Mendoza. It is a well-planned and substantially built town, with wide, clean streets and pure water supply. Among its institutions are a national college, a naval school and a seminary. It exports wine and cattle, especially to Chile and other South American countries. Population in 1905, about 11,500.

San'key, Ira David (1840–1908), an evangelist, born in Edinburgh, Pa. He was chiefly known by his work with Dwight L. Moody, whom he first met in Indianapolis in 1870. Sankey had a fine baritone voice, and his singing was a great help to Moody in evangelical work.

San Luis Potosi, *loo ees' po to se'*, a city of Mexico, capital of the State of San Luis Potosi, is situated 198 mi. n. w. of Mexico, on a plateau 6350 feet above the sea. It is regularly built, has good streets and several plazas, or parks. The most important buildings are the governor's palace, the palace of justice, the townhall, the mint, the exchange, the theater and the Church of San Pedro. The city is an important railroad center and has a large trade in cattle, hides, tallow and wool. It is near the silver mines of San Pedro, which were formerly extensively worked. Population in 1900, 61,019.

San Marino, *ma re'no*, an independent republic in Italy, the smallest state in Europe and one of the smallest in the world, situated within 23 mi. of the Adriatic coast and directly east of Florence. The republic has an area of 22 square miles and consists of a small mountainous district, which attains its highest altitude in Monte Titano, which has an elevation of 2650 feet. On the summit of this hill is built the town of San Marino, which is surrounded by a wall. The town contains several churches and is of interest because of its narrow streets and picturesque, though gloomy, houses, which are built of undressed stone. There are also a council hall, a theater, a museum and a library, and in the center of the principal square stands a white marble statue of "Liberty." The land immediately surrounding the town is cultivated, and grapes are raised in large quantities. The raising of live stock is also an important industry. San Marino is governed by a council of sixty members, elected for life by the nobles, burghers and peasants. From this body an executive council of twelve is chosen, and two captains-regent, or presidents, are elected every six months, one from the nobles and one from the other two classes. This little state is remarkable for the length of time during which it has preserved its identity, being about 1000 years old. Population, about 10,000.

San Martin, *sahn mahr teen'*, José de (1778-1850), a South American general, born in Argentina. He was educated in Spain, entered the army, gained distinction in the war against France and had risen to the rank of lieutenant colonel when, in 1811, he returned to Buenos Ayres. Entering the service of the insurgents there, he was entrusted with raising a troop of cavalry and afterward was appointed to the chief command of the army, acting in Upper Peru against the forces of the viceroy of Lima. In 1815 he organized an expedition for the liberation of Chile, but his army was not ready until two years later. He crossed the mountains early in 1817, and after gaining a brilliant victory at Chacabuco, he was pressed by the people of Chile to take the supreme command and gained a still more brilliant victory at Maipo in 1818. After organizing the government of Chile he sailed with a squadron for Peru, took Lima, drove the Spaniards from the coast and proclaimed Peru independent. In 1822 he sailed secretly for Europe and spent the remainder of his life in absolute seclusion near Paris.

Sanmicheli, *sahn me ka'le*, Michele (1484–1559), one of the ablest architects of his time. He studied under his father, Giovanni, and his uncle, Bartolommeo, who both practiced as architects at Verona with great success. He was distinguished as a military architect and was employed in strengthening the fortifications of Corfu, Cyprus and Candia. One of Sanmicheli's most graceful designs is the Capella de' Peregrins, in the Church of San Bernardino at Verona. He built a great number of fine palaces at Verona, five of which still exist, as well as the graceful Ponte Nuovo. He wrote a treatise on classic architecture, which was printed at Verona in 1735. His work is always refined and his detail delicate.

San Salvador′, a city of Central America, capital of the Republic of Salvador, situated on a small river, 120 mi. s. e. of the city of Guatemala. The city occupies a valley between wooded hills, and to the northwest is the volcano of San Salvador. A railway connects the city with Acajutla and La Libertad. The chief buildings are the national palace, the university, the cathedral, the national library and an astronomical observatory. The city also has a botanical garden. Its trade in agricultural produce is considerable, and it ships large quantities of indigo. Population in 1901, 59,544.

San′skrit Language and Literature. Sanskrit is the name given to the learned and classical language of the Hindus, the language in which most of their vast literature is written, which has not been a living and spoken language since about the second century before Christ. It is one of the Aryan, or Indo-European, family of tongues, and it is related to the Persian, Greek, Latin, Teutonic, Slavonic and Celtic tongues. It stands in the same relation to the modern Aryan languages of India as Latin stands to the Romance languages. It is a highly inflected language, having in this respect many resemblances to Greek. To philologists it has proved perhaps the most valuable of tongues, and it was only after it became known to Europeans that philology began to assume the character of a science. Its supreme value is due to the transparency of its structure and its freedom from the corrupting and disguising effect of phonetic change. The name *Sanskrit* means carefully constructed or symmetrically formed and was given to distinguish it from the vernacular dialects (See PHILOLOGY).

Sanskrit literature covers a period extending from at least 1500 B. C. to the present time. The great mass of the literature is in meter; even works on science and law have a poetical form. The oldest literary monuments are the *Vedas* (See VEDAS). The *Purānas* form another important department of the religious literature, but are very much later than the *Vedas*. There are eighteen of them altogether, forming a vast body of literature of varied contents, the subjects treated comprising mythology, legendary history, cosmogony, with many digressions of a philosophical and didactic nature, though some of them also contain descriptions of places and pretend to teach medicine and grammar. In the department of epic poetry the chief productions are the epics called the *Rāmāyana* and the *Mahābhārata*. In the province of lyric poetry there are poems of great elegance and tender sentiment. Though the Hindus can boast of some excellent specimens of dramatic poetry, yet, on the whole, their dramas are much inferior to those of the Greeks or of modern Europe. The Hindu poetic tales and fables have exercised a most important influence on the whole literature of the East, and even on that of the Middle Ages in Europe. Sanskrit literature was first introduced to the Western world by Sir William Jones, in the end of the eighteenth century.

Santa Anna or **Santa Ana,** *sahn′ta ah′na,* ANTONIO LOPEZ DE (1795?–1876), a Mexican general and politician. He entered the army early, took a prominent part in the expulsion of the Spaniards from Mexico and was at first a supporter of Iturbide. Later he went over to the republicans and helped to overthrow Iturbide. He was in the front during all the subsequent Mexican troubles till 1833, when he became president. By 1835 he had made himself practically the dictator of Mexico. In 1836 Texas seceded, and in the war which followed Santa Anna, after a victory at the Alamo, was defeated at San Jacinto by Houston and taken prisoner. In the following year he was released, on condition of recognizing the independence of Texas. In 1841 he was again made president, but three years later his opponents captured him and banished him to Havana. Recalled in 1846, he was again made president, and during the war with the United States he commanded the Mexican army (See MEXICAN WAR). Owing to his repeated defeats, and especially to the capture of Mexico City, he resigned and left the country. He was recalled again in 1853 and was made president, and again, two years later, he was driven from the country. From that time he had no prominent part in Mexican affairs.

Santa Barbara, *bahr′ba ra,* CAL., the county-seat of Santa Barbara co., 100 mi. n. w. of Los Angeles, on the Santa Barbara Channel and on the Southern Pacific railroad. The city is picturesquely located on a slope above the bay, has a warm, equable climate and is visited by many tourists and health-seekers. The luxuriant growth of flowers, tropical plants and fruits helps to make the city a delightful residence place. The old Franciscan mission here was established in 1786. It is one of the most important and the best-preserved in California, and it is the only one in which services never have ceased to be held. Other prominent buildings are Anthony's College, Saint Vincent's School, the Potter Hotel, Blake Sanatorium and the public library. Large quantities of beans, English walnuts, lemons and olives are grown in the neighborhood, and the city ships considerable fruit, live stock, wool, petroleum and various minerals. Santa Barbara was settled by the Spaniards in 1782 and was incorporated as a city in 1874. Population in 1900, 6587.

San'ta Claus. See Nicholas, Saint.

Santa Cruz, *krooth,* Cal., the county-seat of Santa Cruz co., about 75 mi. s. of San Francisco, on the Bay of Monterey and on the Southern Pacific railroad. The city is beautifully located on a slope above the bay, has a mild, equable climate and is one of the most popular resorts for tourists in the central part of the state. It contains a good bathing beach, picturesque drives and a large public park, overlooking the bay. The surrounding region produces large amounts of fruits, and the city contains a powder mill, and manufactures lead, bitumen, leather, lumber and other goods. It has the school of the Holy Cross, a business college and a large public library. The place was settled by Franciscan missionaries in 1791, and the city was incorporated in 1876. Population in 1900, 5659.

Santa Cruz de la Sier'ra, a city of Bolivia, capital of the department of the same name, is situated 190 mi. n. e. of Sucre. It is the seat of a college, and its industries include the manufacture of flour and sugar. Population in 1900, 15,874.

Santa Fé, *fay',* a city of Argentina, situated on the e. bank of the Salado River, 230 mi. n. n. w. of Buenos Ayres. It is connected with Rosario, 90 miles distant, by rail. It is the seat of a normal school, a Jesuit college and a seminary. It is an important shipbuilding center and has considerable trade in hides and lumber. Population, about 25,000.

Santa Fé, N. M., the capital of the territory and the county-seat of Santa Fé co., 21 mi. e. of the Rio Grande River, 40 mi. w. of the city of Las Vegas and on the Denver & Rio Grande and the Atchison, Topeka & Santa Fé railroads. The site of the city was first visited by Spaniards about 1542, when they found a large pueblo, containing some 15,000 indians. About 1605 the Spaniards found the place deserted and made a settlement, enslaved the neighboring indians and opened up extensive gold and silver mines. In 1680 the indians captured the place, but the Spaniards regained possession in 1692. It was taken by United States troops in 1846. In 1851 it was made the capital of the newly organized territory and was chartered as a city in 1890.

Santa Fé is beautifully situated on a plain almost 7000 feet in elevation and is surrounded by mountain peaks rising to heights of from 10,000 to 13,000 feet. The old Spanish section has narrow, crooked streets, and the buildings are low, one-story adobe structures. The modern part has wide streets and contains many good business blocks and fine residences. In the center of the city is a public square, known as the Plaza. Facing this on the north is the governor's mansion, a one-story adobe building, about a square in length, containing an inside court, and built in the early part of the seventeenth century. Here all the governors of the territory, both Spanish and American, have lived, and it was here that General Lew Wallace finished writing *Ben Hur*. In connection with this building is an historical museum, containing early Spanish paintings and many interesting relics. Also of historical interest are the Church of San Miguel, old Fort Marcy, Rosario Chapel and the partly rebuilt Cathedral of San Francisco. The educational institutions include the Saint Michael's College, Loretto Academy, Allison Mission, the government and Saint Catherine's indian schools, and an industrial school for the deaf and dumb. Other prominent buildings are the capitol, the penitentiary, the Federal building, a hospital and the territorial orphan asylum. In the vicinity are kaolin mines and deposits of coal, but stock raising is the most important industry. The city is principally engaged in wholesale and retail trade with the surrounding region. As a business center it has declined since the construction of the railways and the abandonment of the overland route by way of the Santa Fé trail. The excellent climate has made the city a popular health resort, and its historic interests attract many tourists. Population in 1900, 5603.

Santa Maria di Capua Vetere, *sahn'ta mare'a de kah'poo a va'tai ray.* See Capua.

San'ta Mau'ra or **Leucadia,** an island of Greece, one of the Ionian group, situated about one mile off the west coast. Its area is 109 square miles, and its population is about 35,000. The inhabitants are chiefly engaged in fishing and in salt manufacture. The chief town is Amaxichi.

San'ta Ro'sa, CAL., the county-seat of Sonoma co., 52 mi. n. by w. of San Francisco, on Santa Rosa Creek and on the Southern Pacific and the California Northwestern railroads. The city has a great profusion of blooming roses the year round, and the wide streets are lined with large shade trees. It contains the Pacific Methodist College, the Ursuline Academy, the Santa Rosa Ladies College and a public library. The surrounding country is principally engaged in the raising of fruit, vegetables and nursery stock, and the city has large wine-making and fruit-canning establishments, also wool, flour and lumber mills, tanneries and other factories. There is a considerable trade in hay, grain, live stock and wool. The town was settled about 1850 and was incorporated in 1854. Population in 1900, 6673.

Santiago, *sahn te ah'go,* the capital of Chile, situated on the Mapocho River, 42 mi. s. e. of Valparaiso, and on a plain at the foot of the Andes, at an elevation of about 1800 feet. The city is well laid out; the streets are paved and lighted by electricity, and many of them contain street railway lines. Owing to the prevalence of earthquakes, many of the houses are of only one story and usually occupy a large space of ground, having gardens around them and courts in the interior. The city contains a number of prominent public buildings of recent construction and these add much to its beauty. Among them are the hall of congress, the mint, the exposition palace, the academy of sciences, the national library and the national museum. The city contains a number of educational institutions, among them a university and a normal institute. There is also a botanical garden and an observatory. The manufactures are of little importance. Santiago was founded in 1541 by Valdivia. On Aug. 16, 1906, an earthquake destroyed hundreds of buildings, valued at more than $10,000,000, killed several hundred people and rendered thousands homeless. Santiago's great port, Valparaiso, was even more seriously affected, while the neighboring city of Quillota, with a population of 60,000, was almost annihilated. Population in 1900, 269,886.

Santiago, BATTLE OF, a naval battle during the Spanish-American War, fought off Santiago de Cuba, July 3, 1898, between a United States squadron, under Sampson and Schley, and a Spanish fleet, under Admiral Cervera. The Americans had confined Cervera's squadron to the harbor of Santiago for several weeks, while the land forces were completing the investment of the city. Cervera was ordered by his government to attempt to make his escape, and on the morning of July 3 he led a dash from the harbor. After a running fight lasting most of the day, all the Spanish vessels were beached or destroyed, and Cervera and 1700 men were taken prisoners, while 350 Spaniards were killed and 160 wounded. The American loss was one man killed and ten wounded.

Santiago de Cuba, a city, situated on an excellent harbor on the south coast of the island of Cuba, 475 mi. s. e. of Havana, with which it is connected by rail. The harbor is entered through a narrow channel, which is defended by forts. Santiago is the second city in population and commercial importance in the Republic of Cuba. Its chief buildings are a cathedral and a government palace, a theater and military and other hospitals. The city also has a number of charitable and industrial institutions. It is situated in the midst of a rich agricultural district and exports sugar, hides, wax, tobacco and copper and iron ore. There are a few iron foundries and machine shops and tobacco factories. The town was founded in 1514; it was the chief point of attack by the Americans during the war with Spain and was captured by them July 3, 1898. It was from this harbor, also, that the Spanish fleet attempted to escape at the time of its capture by the United States squadron. Population in 1899, 43,090.

Santiago de Guayaquil, *gwi ah keel'.* See GUAYAQUIL.

Santo Domin'go, the capital of the Republic of Santo Domingo, situated on the south coast of the island, at the mouth of the Ozama River. The city is enclosed by a wall. It has poor, uneven streets and thatched houses. The public institutions consist of a cathedral, a government residence, an arsenal and a barracks. There are also some hospitals and a high school. Santo Domingo was founded in 1496 by Bartholomew Columbus, and next to Isabella it is the oldest European settlement in the New World. Christopher Columbus was buried here in 1536, but his remains were removed to

Havana in 1794. Population, estimated at from 20,000 to 25,000.

Santo Domingo or **San Domingo** (also called The Dominican Republic), a republic occupying the eastern part of the island of Haiti. Its area is about 18,000 sq. mi., making it a little smaller than the State of Delaware. For physical features, see Haiti. Most of the land is suitable for cultivation, and in the south and west there are some large plantations. The chief products are sugar cane, coffee, cacao and tobacco. A considerable area is covered with forests of valuable timber, such as mahogany, satinwood, cedar and logwood. There are some minerals, including gold, iron, copper and coal, but they have not been worked. In general, roads are poor and communication and transportation are difficult. The republic has about 130 miles of railway, connecting the capital, San Domingo, and Azua, on the southern shore, and on the northern shore connecting Puerto Plata and a number of commercial ports with Sanchez, at the western extremity of the island.

The inhabitants are a mixed race of Spanish, indian and negro descent. The Spanish language is in general use. The prevailing religion is Roman Catholicism. Santo Domingo became an independent republic in 1844, since which time it has existed under a number of constitutions. During most of its existence its history has been one of rebellions, revolutions and counter-revolutions, so that no form of government has continued for a great length of time. The industries of the republic have been paralyzed, the people are generally poor and ignorant and the condition of the country is deplorable. Because of difficulty with foreign nations on account of the failure of the San Domingans to pay debts due the subjects of those nations, the United States government took charge of the customs in 1905 and is to remain in control of financial matters until the foreign debt is paid. Santo Domingo is the capital. The most important seaport is Puerto Plata, on the northern coast, which is also a cable station. See Haiti.

Santos, *sahn′tos*, a city of Brazil, situated on the coast, 30 mi. s. e. of São Paulo. It has a deep and commodious harbor, and, next to Rio Janeiro, is the most important seaport of the country. The city is well built and has good streets and a number of parks, as well as public institutions of importance. It is one of the chief ports for the shipping of coffee and is considered by some the most important coffee-shipping port of the world, its annual export amounting to about 750,000,000 pounds. The population is estimated at from 35,000 to 40,000.

Santos-Dumont′, Alberto (1873–), a famous aeronaut, born in Brazil. He inherited a large fortune, the most of which he devoted to the perfecting of a practical air ship (See Flying Machine, subhead *Dirigible Balloons*). His account of his experiments, *My Airships: A Story of My Life*, was published in 1904.

São Luiz, *sowN loo eesh′*. See Maranhão.

Saône, *sone*, a river of eastern France, rises in the Department of Vosges, enters the Department of Haute-Saône, then flows through the Department of Cote-d'Or, continues southwest and receives the Doubs as a tributary. From Châlon it flows due south until it joins the Rhone at Lyons. Its length is 280 miles, of which 190 are navigable. It is connected by canals with the Rhine, the Loire and the Seine.

Sap, the juice or fluid which circulates in all plants, being as necessary to vegetable life as blood is to animal life. It contains water taken from the soil, but also has various food products in solution, which are carried throughout the plant. As sap rises from the root it is little more than water, but as it returns from the leaves it has larger quantities of food and in some plants becomes quite thick and milky. Usually, however, the liquid is very thin, the sugar beet, for instance, having not more than ten to seventeen per cent of sugar in its sap. Sugar, a number of palatable drinks and some intoxicating ones and various drugs are prepared from sap.

Sapajou, *sap′a joo*, the name generally given to a group of South American prehensile-tailed monkeys, including fifteen or sixteen species, whose characteristics it is exceedingly difficult to define. Among the species may be named the *horned sapajou*, also called *horned capuchin*, and the *capuchin*. One of the most common species is the *weeper*. They are small in size, playful in disposition, live in large bands and feed chiefly on fruits and insects.

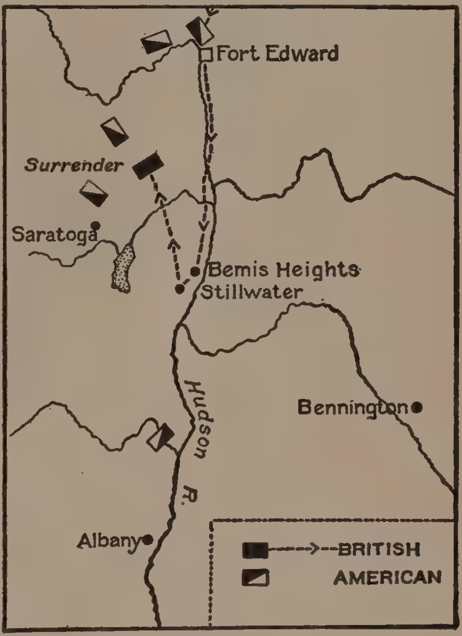
Sapphire, *saf′ire*, a precious stone, next in hardness to the diamond, belonging to the corundum class. Sapphires are found in various places, as Burmah, India and Ceylon, in Asia, and Bohemia and Silesia, in Europe. The sapphire proper is a beautiful transparent stone, of various shades of blue. See Ruby.

Sappho, *saf′o*, a Greek poetess, born probably in the seventh century b. c., at Mitylene, on the island of Lesbos. Little is known regarding her life, though she is made the subject of various legends. Of these may be mentioned the common story of her unrequited love for Phaon and her leap from the Leucadian Rock. At Mitylene, Sappho appears to have been the center of a group of maidens whom she instructed in the art of song. Her odes, elegies and epigrams, of which only fragments have come down to us, display deep feeling and imagination. The reverence shown her by the ancients was most extravagant.

Saracens, *sar′a senz,* originally a name belonging to a tribe of northern Arabia. By Greek and Latin writers, the name was applied to all Arabians and, after the rise of Mohammedanism, to all people who accepted that faith. The Saracens succeeded during the seventh and eighth centuries in establishing an empire in northern Africa and in Spain, but their attempt to push on to Gaul was prevented at Tours by Charles Martel.

Saragossa, *sah ra gohs′sa,* a city of Spain, capital of the province of the same name, situated on the Ebro River, 176 mi. n. e. of Madrid. It is in the midst of a fertile and well cultivated region. The town has an ancient appearance, having narrow, crooked streets and many ruined structures of medieval times. The most important buildings are the cathedral, dating from the twelfth century, the archbishop's palace and the Castilio de la Aljaferia, which was at one time the residence of the king of Aragon. The leading industries include manufactures of textiles, soap, chocolate and flour. Population in 1900, 98,125.

Sar′ato′ga, BATTLES OF, two important battles in the Revolutionary War, known, also, as the Battles of Freeman's Farm, the Battles of Bemis Heights and the Battles of Stillwater. General Burgoyne, commanding a British force of 10,000 men, here met an American army under Benedict Arnold, Horatio Gates and Philip Schuyler. The opening skirmish occurred on September 13, when Burgoyne attempted to advance against the American position on Bemis Heights. It ended without great advantage to either party, and it was three weeks later before the contest was renewed. At that time the British opened the attack, but were met by counterattacks on each flank and after severe fighting were totally routed. The American army pursued the British, completely surrounded them, and forced a surrender, October 17, 1777. This victory greatly increased the prestige of the American cause in Europe and was one of the events which led directly to the treaty of alliance with France. It has been regarded as one of the fifteen decisive battles of the world.



BATTLES OF SARATOGA

Saratoga Springs, N. Y., a village in Saratoga co., 38 mi. n. of Albany, on the Delaware & Hudson and the Boston & Maine railroads. It has about fifty springs, which give forth waters with medicinal properties, and is a very popular health and summer resort. The village is on the southernmost spur of the Adirondacks, at an elevation of about 300 feet, in a region free from swamps and marshes. There are large hotels, which are said to have accommodated as many as 40,000 guests at one time. The Convention Hall, seating 6000 people, has made it a favorite place for conventions. Saratoga Lake, four miles distant, has been the scene of numerous regattas. The races during August and a floral fête in September also add to the popularity of the resort. The village contains an athenaeum, a public library, an art gallery, a townhall, containing the theater, Saint Faith School, a state armory, a home for orphans and two hospitals. Since 1826 the mineral waters have been shipped to various parts of the world. The principal industries are the bottling of these waters, the making of carbonic acid gas and the manufacturing of foundry products and supplies for druggists and doctors. Saratoga is an indian name meaning *Hillside of the Great River.* About 1773 the first log cabin was built here. The village proper began about 1792 and was incorporated in 1826. Population in 1905, 13,000.

Saratov, *sah ra tohf′,* a city of Russia, situated on the right bank of the Volga, 450 mi. s. e. of Moscow. It is an important commercial center and has a number of manufactories. It has also an academy of natural history and a biological station. Population in 1897, 137,109.

Sarcophagus, *sahr kof′a gus,* a stone coffin. The earliest specimens were found in Egypt and were made of alabaster, limestone, granite or some other durable material. The oldest ones are rectangular in shape and have a flat or curved cover and little ornamentation. But the later ones have the shape of the human body and are covered with inscriptions or with carved figures of the kings. Sarcophagi were also used by the Phoenicians, Persians, Romans and Greeks. Some of the Roman and Greek tombs are especially beautiful, being ornamented with elaborate sculptures. In modern times stone coffins are common among persons of high rank and great wealth.

Sard, a variety of chalcedony, which displays on its surface a rich, reddish brown, but when held between the eye and the light appears of a deep, blood-red hue. It is also called *sardoin.*

Sar′danapa′lus, the name given by the Greeks to the Assyrian king Assurbanipal, who ruled at Nineveh from 668 to 626 B. C. During his reign, Egypt was lost to Assyria, and an insurrection in Babylonia was suppressed only after a long struggle. Sardanapalus is particularly noted for the great buildings which he erected in Nineveh and certain of the Babylonian cities. He also collected at Nineveh a great library, and many of the brick books from this library are now in the British Museum. Sardanapalus was the last of the great Assyrian kings.

Sardine, *sahr′deen,* a small fish of the herring family, abundant in the Mediterranean and also on the Atlantic coasts of France, Spain and Portugal. It is much esteemed for its flavor, and large quantities are preserved by being salted and partly dried, then scalded in hot olive oil and finally hermetically sealed in tin boxes, with hot salted oil or with oil and butter. Commercially the name is applied to any small fish put up in oil. On the eastern coast of Maine, young menhaden are canned as sardines, but they are much inferior to the real sardine of Europe.

Sardin′ia, an island situated in the western part of the Mediterranean Sea, forming a part of the Kingdom of Italy. It is 115 mi. s. w. of Italy and is separated from Corsica by the Strait of Bonifacio. Its length is 170 mi., its greatest breadth is 80 mi. and its area, including several small islands along the coast, is 9306 sq. mi. The island is approximately rectangular in shape, but the coasts are bold, irregular and precipitous and contain a number of important indentations. Chief among these are the Gulf of Asinara, in the northwest, the Gulf of Oristano, in the west, and the Gulf of Cagliari, in the southeast. The interior of the island is mountainous, the main chain extending approximately north and south and sending out branches to the east and west. The highest peak is Gennargentu, a little east of the center of the island, with an altitude of more than 6000 feet. The island contains a number of large plains, which are noted for their fertility. The most important of these is called Campidano and extends across the southern part of the island, from the Gulf of Orestano to the Gulf of Cagliari. The island contains a number of streams, but owing to the peculiarity of the surface they are too rapid to be of service for navigation. The climate is mild and equable. Extensive crops of wheat are raised, and olives, grapes, oranges, lemons and tobacco are also grown. Considerable attention is given to the production of wine. The pasturage is good, and large numbers of sheep, goats and cattle are found. The minerals include lead, zinc, silver and antimony. Manufactures are few and are confined to cigars and fabrics woven on hand looms. The exports consist of corn, wine, timber, fish, cattle, lead ore, calamine and salt. The imports include cotton, manufactured goods, hardware and coal. There are few railways on the island.

In ancient times Sardinia was occupied by the Carthaginians, but at the close of the First Punic War (241 B. C.) they were compelled to cede it to the Romans. During the Middle Ages the island was successively in the hands of the vandals, the Goths, the Lombards and the Saracens. In 1297 it became a possession of the king of Aragon. In 1714 Spain ceded it to Austria, and in 1720 Austria ceded it to Savoy, in exchange for Sicily, and it remained in possession of this house and became in 1861 part of United Italy.

Sardinia, KINGDOM OF, a former kingdom of the south of Europe, composed of the island of Sardinia, the duchy of Savoy, the principality of Piedmont, the county of Nice, the duchy of Genoa and parts of the duchies of Montferrat and Milan. In 1720 Victor Amadeus, duke of Savoy, on receiving the island of Sardinia in exchange for Sicily, took the title of king of Sardinia. Turin was the capital, and Piedmont was the most important part of the kingdom. He was succeeded by Charles Emmanuel I, Victor Amadeus II and Charles Emmanuel II, who in 1802 abdicated in favor of his brother Victor Emmanuel I, the royal family having by this time, during the domination of Napoleon, taken refuge on the island of Sardinia. In 1814 the king returned to Turin, where the seat of government was reëstablished. An insurrection brought about his abdication in 1821 in favor of Charles Felix, who, after a reign of ten years, was succeeded by Charles Albert. In 1848 Charles Albert headed the league which endeavored to drive the Austrians from Italy. The defeat of the Sardinian forces at Novara (1849), however, caused him to abdicate in favor of his son, Victor Emmanuel II. The position of Sardinia was strengthened by the part which it played in the Crimean War, and in 1859 the coöperation of France was secured in a war against Austria. The brief campaign which followed ended in the defeat of the Austrians at Magenta and Solferino and resulted in the cession to Sardinia of a large increase of territory, though she had to cede Savoy and Nice to France. Soon after this the Sardinian kingdom was merged in a united Italian kingdom under Victor Emmanuel. See VICTOR EMMANUEL II; ITALY, subhead *History*.

Sard′onyx, a precious stone, a beautiful and rare variety of onyx, consisting of alternate layers of sard and white chalcedony. The name has sometimes been applied to a reddish yellow or nearly orange variety of chalcedony, resembling carnelian, and also to carnelians whose colors are in alternate bands of red and white. See ONYX.

Sardou, *sahr doo′*, VICTORIEN (1831–1908), a French dramatist. He at first studied medicine, but abandoned this in favor of literature. His earliest venture was the comedy of *The Students' Inn,* which proved a failure, at the Odeon. He was successful, however, with two plays which he wrote for Déjazet, called *Monsieur Garat* and *Saint Gervais.* His better known works, many of which have been produced on the English stage, are *Our Intimates, The Butterfly, Daniel Rochat, The Benoiton Family, Dora* and *Madame Sans Gêne.* His later successes have been associated with Madame Bernhardt, for whom he has written *Fédora, Théodora, La Tosca* and *The Sorceress.*

Sargent, *sahr′jent,* EPES (1813–1880), an American editor, poet and dramatist, born at Gloucester, Mass. He was educated in Boston and at Harvard University, became associated with the Boston *Advertiser* and the *Atlas,* removed to New York, where he was assistant on the *Mirror,* and subsequently returned to Boston, to become editor of the *Evening Transcript.* He afterward devoted himself entirely to literature, and produced, among other works, *The Bride of Genoa,* a poetical drama; *Velasco,* a tragedy; various novels and books of adventure; a *Life of Henry Clay,* and two volumes of poetry. He was the author of the well-known lyric, *A Life on the Ocean Wave.*

Sargent, JOHN SINGER (1856–), an American painter, born in Italy. Most of his life has been spent abroad. He traveled about Europe with his parents, was educated in Italy and Germany and at seventeen was an art student in Florence. In the following year he went to Paris and became the pupil of Carolus Duran. When he was twenty years old he made his first visit to the United States, and at different times subsequently he spent short periods in America. His home, however, was always in Paris or London. Sargent ranks as one of the foremost portrait painters of his time. His portraits include those of Duran, Edwin Booth, Joseph Jefferson, Ada Rehan, Ellen Terry as Lady Macbeth, Secretary Hay and President Roosevelt. *Carmencita,* a dancer in costume, and *Carnation Lily, Lily Rose,* two girls lighting Japanese lanterns in a flower garden, are among his best-known and best-liked pictures, and his paintings in the Boston Public Library are among the finest of mural decorations.

Sargon II, *sahr′gon,* a famous king of Assyria. He succeeded Shalmaneser IV in 722 B. C. and undertook immediately after his accession the conquest of Samaria. In this he was successful, as he was in Media and against the Syrian cities which revolted. His greatest achievement was the subjugation of Babylon, which submitted to him in 709 B. C. Four years after this he died.

Sark, *sahrk,* one of the Channel Islands. See CHANNEL ISLANDS.

Sarmatians, *sahr ma′shanz,* a people who, in the time of the Romans, occupied the vast region between the Black, Baltic and Caspian seas and were said by tradition to be descended from the Amazons by Scythian fathers. They were a nomadic race, whose women went to war like the men.

Sar'nia, a town of Ontario, Canada, situated on the Saint Clair River, near Lake Huron, and on the Grand Trunk and the Pere Marquette railways, 61 mi. w. of London. It is connected with Port Huron, across the river, by ferries and by a railway tunnel about one and one-quarter miles long. The leading industrial establishments include foundries, machine shops and factories for the manufacture of engines and agricultural implements and woolen goods. Population in 1901, 8176.

Sarpe'don, in Greek mythology, king of the Lycians and ally of the Trojans. He was slain by Patroclus, and his body was rescued and purified by Apollo. According to different accounts, he was either the son of Jupiter and Laodamia or the grandson of another Sarpedon, the son of Jupiter and Europa.

SARSAPARILLA

Sar'saparil'la, a drug obtained from the roots of several species of smilax. The plants are tough, twining shrubs, with prickly stems, small flowers and shiny leaves. They are natives of the warm regions of America, being found in South America and on the Mexican Andes. The dry roots of the plant are used in medicine and are odorless and bitterish. Formerly sarsaparilla was considered an efficacious cure in various diseases, but it is now used mostly in spring medicines and is believed to be a blood purifier.

Sarto, *sahr'to,* ANDREA DEL (1487–1531), a Florentine painter, known, because of the excellence of his technique, as the "Faultless Painter." He was the son of a tailor and was apprenticed in his youth to a goldsmith. He studied painting under several masters, but the instruction he received can by no means account for the rapid progress he made in his art. Before he was thirty he painted a beautiful series of frescoes in the Church of the Servites and was recognized as one of the best fresco painters in Florence. Ten scenes from the life of John the Baptist and a *Last Supper* are among his famous frescoes. In 1518 Andrea went to France and painted for Francis I, but by 1521 he was again in Florence, where the remainder of his life was chiefly spent. His most famous pictures, besides the frescoes, include the *Annunciation,* several *Holy Families,* the *Madonna with the Harpies* and a number of portraits. The coloring of Andrea's pictures is especially beautiful, but there is not much originality of conception or elevation of sentiment evident.

Saskatch'ewan, a province of Canada. In 1905 the four districts, Alberta, Athabasca, Saskatchewan and Assiniboia, were made into two provinces, Alberta and Saskatchewan. The Province of Saskatchewan covers an area of 251,000 square miles. Its northern boundary is 265 miles; the southern, 375, and the length, 720 miles. The capital is Prince Albert. Population, estimated at 230,000.

Saskatchewan River, one of the largest rivers of Canada, formed by two branches, often known as the North Saskatchewan and the South Saskatchewan. The north branch rises in the Rocky Mountains, in the west part of Alberta, and the south branch, which is often known in the upper part of its course as the Bow River, rises in the vicinity of Devil's Lake, in western Alberta. After winding courses of 800 to 900 miles, these streams unite in the district of Saskatchewan, and the united stream flows eastward into Lake Winnipeg. From this lake it is generally known as the Nelson (See NELSON RIVER). The length of the united Saskatchewan is about 300 miles. Boats ascend to Edmonton, on the north branch, a distance of about 850 miles.

Sas'safras, a genus of plants, of which the *sassafras laurel* is the best-known species, on account of the medicinal virtues of its root. In the woods of North America it is a small tree or shrub, but in the south it grows to a height of forty-five feet. The taste of sassafras is sharp, bitter and aromatic; it is used for flavoring purposes and in medicine, sassafras tea being a common home remedy for purifying the blood. Oil of sassafras is manufactured in large quantities in Baltimore.

Sat'ellite, a secondary planet; a small planet revolving round a larger one. The earth has one satellite, called the moon; Neptune is also accompanied by one; Mars, by two; Uranus, by six; Jupiter, by seven; Saturn, by at least eight. Saturn's rings are supposed to be composed of a great multitude of small satellites.

Sat'in, a soft, closely woven silk, with a glossy surface. In the manufacture of satin, part of the weft is left beneath the warp, which, presenting a close and smooth surface, acquires, after being passed over heated cylinders, that luster which distinguishes it from other kinds of silks. It is of Chinese origin, but is now made extensively in Europe.

Sat'ire, in the widest sense of the word, pungent ridicule or cutting censure of faults, vices or weaknesses. In a narrower sense it is a poem, of which ridicule and censure are the object and chief characteristic. This species of poetry had its origin with the Romans. Satires may also take the forms of epistles, tales, dialogues, dramas, songs, epics or fables. The didactic satire originated with Lucilius, and Horace, Juvenal and Persius developed it. Satires are common in all modern literatures.

Satolli, *sa tol'le,* FRANCESCO (1831–1910), an Italian churchman, born at Perugia. Soon after his ordination as a priest in the Catholic Church, he was appointed professor in a Roman seminary and in 1888 was made archbishop of Lepanto. In November, 1892, he was sent to America as papal ablegate, for the settlement of certain problems in the Church, and in the following year he was made apostolic delegate. In 1895 he was made a cardinal and in the following year was recalled to Rome.

Sat'urday (Saturn's day), the seventh, or last, day of the week; the day of the Jewish Sabbath.

Sat'urn, in classical mythology, an early god, the husband of Rhea, and father of Jupiter, Neptune, Pluto, Juno, Vesta and Ceres. He deposed his own father, Uranus, and ruled in his stead, and fearing, because of a prophecy, that he in his turn would be dethroned by his own son, he swallowed his children as soon as they were born. Jupiter alone was saved by a strategem of his mother's, and he deposed his father and compelled him to disgorge the five children whom he had swallowed. Saturn, when he could no longer rule among the gods, withdrew to Italy and there founded a prosperous kingdom.

Saturn, the sixth planet from the sun. Its diameter is about 70,000 miles, and its mean distance from the sun is about 875,000,000 miles, and about 29½ years are required for it to make a revolution around the sun. In mass it is about 90 times as great as the earth. The planet ranks next to Jupiter in size, and turns on its axis in about ten hours, a trifle longer time than it takes Jupiter. Saturn has at least eight satellites and is surrounded by a system of flat rings, which are now supposed to be an immense multitude of small satellites, with vaporous matter intermingling. The outer ring, which is not less than 168,000 miles in diameter, is probably 100 miles thick and about 10,000 miles broad. Seen by the unaided eye, Saturn is a bright star, with a slightly reddish tint. Saturn probably resembles Jupiter in being a gaseous body, surrounded by a very dense atmosphere. For several years after 1905 it will be best seen in late summer and early autumn in the eastern or southeastern sky, moving south as the evening advances.

Sat'urna'lia, a festival held by the Romans in honor of Saturn, during which the citizens, with their slaves, gave themselves up to unrestrained freedom and mirth. It lasted at first only one day; then three; afterward five, and finally, under the Caesars, seven days, namely, from the seventeenth to the twenty-third of December. During its continuance no public business could be transacted, the law courts were closed, the schools kept holiday and slaves were free from restraint. Masters and slaves even changed places, so that while the servants sat at table, they were waited on by their masters and their guests. In the last days of the festival, presents were sent by one friend to another.

Satyrs, *sa'turz,* in Greek mythology, a class of woodland divinities, in later times inseparably connected with the worship of Bacchus. The satyr appears in works of art as half man and half goat, having horns on the head and a hairy body, with the feet and tail of a goat. Satyrs are described as being fond of wine and of every kind of sensual gratification.

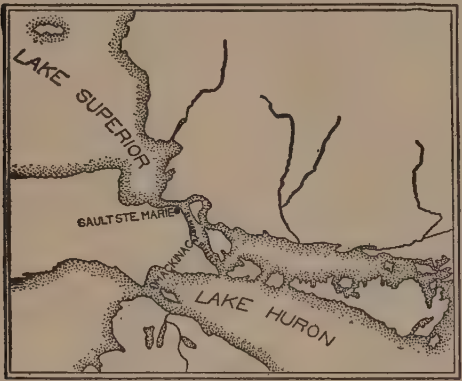
Sau'gus, Mass., a town in Essex co., about 4 mi. w. of Lynn, on the Saugus River and on the Boston & Maine railroad. It is a residence place and has a public library and a high school. There are also manufactures of woolens, boots and shoes, brick and other articles. Population in 1905, including several villages, 6253.

Sauk. See Sac.

Saul, the son of Kish, a Benjamite, king of Israel from about 1095 to 1056 B. C. He was selected for this office by Samuel and obtained, by his personal courage and military capacity, several successes over the Philistines, Edomites, Moabites and Ammonites, by means of which he consolidated the tribes and confirmed his authority. His history is found in *I Samuel.*

Sault Sainte Marie, *soo saint ma're,* or (French) *so saNt ma re',* a village and port of entry in Ontario, Canada, on the Saint Mary's River and on the Saint Mary's Falls ship canal. It is connected with Sault Sainte Marie, Mich., on the opposite side of the river, by a railway bridge one mile long, used by the Northern Pacific and Canadian Pacific railways. The town is surrounded by a fertile agricultural region and also has important mining and commercial interests. Population in 1901, 7169.

Sault Sainte Marie, Mich., the county-seat of Chippewa co., 350 mi. w. n. w. of Detroit, on the Saint Mary's River and on the Canadian Pacific, the Duluth, South Shore & Atlantic and other railroads, and on the Sault Sainte Marie ship canal, which connects Lake Superior with Lake Huron. The falls in the river have been utilized in the development of very extensive electrical power. The industrial establishments are fish-packing houses, lumber mills, paper mills, a carbide factory, machine shops, flour and woolen mills and other factories. The city has a public library, Fort Brady, Canal Park and a large railroad bridge over the rapids to Sault Sainte Marie, Ont. The Jesuits established a mission in 1641, and the first permanent settlement within the present State of Michigan was made here by Father Marquette in 1662. Population in 1904, 11,442.



Sault Sainte Marie Canal, a canal around the Sault Sainte Marie rapids, connecting Lake Superior with the Saint Mary's River at Sault Sainte Marie, Mich. This canal consists of a short channel and two locks, side by side. Its entire length is two-thirds of a mile, and its fall is eighteen feet. This canal is notable for the size of its locks and for the extent of the freight traffic. The Poe lock, which is the largest in the world, is 800 feet long, 100 feet wide and 21 feet deep above the sill and has a lift of 18 feet. Its cost exceeded $5,000,000. The number of boats passing through it each season is four times the number passing through the Suez Canal. There is also a similar canal on the Canadian side, with a somewhat smaller lock. It carries less than four per cent of the traffic.

Sau'ry Pike, called also the *skipper* or *bill-fish.* The name is applied to the genus, as well as to any of the species. The true saury is about eighteen inches long, is olive-brown and silvery on sides and belly, with a silver band around the back. It is found on both sides of the Atlantic.

Sausage, a preparation of chopped meat, consisting of lean and fat pork and beef, in varying proportions, and seasoned with salt, pepper, sage and sometimes other spices. In the large packing houses, sausage is made by machinery. Trimmings of all sorts are used. After chopping, the salt and pepper are mixed with the meat, which is then mixed with enough warm water to make the mass soft and pliable. The sausage is then pressed into skins, which are made into links, as they are seen on the market. There are many varieties of sausage, according to the different proportion and kinds of meats used and the methods of seasoning. The yearly output of sausage in the United States amounts to over two hundred ninety-two million dollars. See Meat Packing.

Savan'nah, Ga., the county-seat of Chatham co., on the Savannah River, 14 mi. from the ocean, and on the Southern, the Atlantic Coast Line, the Seaboard Air Line and other railroads. It is built on a plateau about forty feet above the river and is laid out with broad streets, crossing at right angles. The city covers an area of about seven square miles and has about 100 miles of streets, more than one-third of which are well paved. It has sometimes been called "the Forest City," from its ornamental shrubbery and luxuriant shade trees. Forsyth Park, in the center of the city, covers ten acres and contains a beautiful fountain and a monument to the Confederate dead. There are also about thirty public squares, with monuments to Nathanael Greene, Sergeant William Jasper, Count Casimir Pulaski and others.

The city has good public schools, free kindergartens, several private schools, a public library and the Telfair Art Gallery. There are numerous charitable institutions, including the Savannah and the Saint Joseph's hospitals, the Georgia infirmary for colored people, the Episcopal orphans' home and the Telfair Hospital for women. About ten miles from the city is the Bethesda Orphanage, which was founded by Rev. George Whitefield in 1740. There are many churches, some of them built in the old colonial style of architecture. On the site of Christ Church, John Wesley founded the first Sunday-school in America. Other prominent buildings are the courthouse; the Federal building; the union passenger station; the Hodgson Hall, containing the library and collection of the Georgia Historical Society; the De Soto Hotel; Masonic Temple; Odd Fellows' Hall, and several school, bank and business buildings.

The surrounding country produces rice, cotton, sugar cane, vegetables and fruits, and truck gardening is very extensively carried on near the city. The manufacturing industry is of recent development, but of very rapid growth. The products now include fertilizers, cottonseed oil, copper goods, crates and boxes, railroad cars, locomotives, candy, brooms, baking powder, cigars, ice, sash and blinds, patent medicines and various other articles. The city has a very large trade, both coastwise and foreign, and exports cotton, rosin, spirits of turpentine, lumber and timber, phosphate rock, fruits, vegetables and various manufactured goods. From 1900 to 1904 the number of establishments and the number of hands employed increased 125 per cent, while the value of the products increased about 66 per cent.

Savannah was settled in 1733 by a small company under the leadership of Gen. James Edward Oglethorpe. During the Revolution the town was fortified by the Americans, but was captured by the British in 1778 and held until the end of the war. It was chartered as a city in 1789. The first steamship which crossed the Atlantic set sail from here, was owned by Savannah people and was called the *Savannah* (See STEAMBOAT). At the time of the Civil War the city had about 25,000 people. It was the end of General Sherman's famous march to the sea and was surrendered after a brief defense and the destruction of the navy yard (Dec. 21, 1864). Population in 1900, 54,244, of whom 28,090 were of negro descent and only 3434 of foreign birth. The corporation has since been extended, and the population in 1905 was estimated at 70,000. Consult C. C. Jones's *History of Savannah to the Close of the Eighteenth Century.*

Savannah River, a river formed in South Carolina, by the union of the Tugaloo and the Kiowee. It flows in a southeast direction into the Atlantic Ocean, forming a part of the boundary between Georgia and South Carolina. Its length is about 450 miles, and it is navigable for large steamers as far as Savannah and for smaller steamers to Augusta, about 230 miles, while the smallest craft ascend for 150 miles farther.

Save, *sahv,* a river of Austria-Hungary. It rises in the Julian Alps in the north part of Carniola, flows southeast, then east by south, and joins the Danube at Belgrade. Its length is a little over 500 miles, and it is navigable through the lower part of its course. Agram is the chief town on its banks.

Savings Banks, institutions organized for the accumulation and use of small sums of money. They originated about the middle of the eighteenth century, though they had been suggested at an earlier date. The first bank of the kind was established at Brumath, France, in 1765. The chief purpose of such institutions was originally, and has continued to be, the providing of facilities for the safe keeping of small savings, which the larger banks could not profitably handle. The first savings bank established in the United States was the Philadelphia Saving Fund Society, which was founded in 1816 and chartered in 1819. Others soon arose, especially in New England, and their number rapidly increased until in 1905 there were nearly twelve hundred in the United States. They are under the control of state laws, which, however, agree in most important points, the tendency being to require conformity to more and more rigorous conditions. Some states now prescribe the maximum rate of interest to be paid by such institutions and even specify the securities in which such banks may invest. The following table shows the progress of savings banks in the United States since their origin:

Date	Number of Banks	Number of Depositors	Total Deposits
1820	10	8,635	$1,138,576
1830	36	38,085	6,973,304
1840	61	78,701	14,051,520
1850	108	251,354	43,431,130
1870	517	1,630,846	549,874,358
1890	921	4,258,893	1,524,844,506
1900	1002	6,107,083	2,449,547,885
1904	1157	7,305,443	3,060,178,611
1906	1319	8,027,192	3,482,137,198

In most of the countries of Europe *postal savings banks* have been established, conducted through the regular postoffice department. Deposits are received in any postoffice, passbooks being furnished in which the amount is entered, official receipts being later sent from the general office. The minimum deposit received is usually about twenty cents. All deposits are guaranteed by the government, interest being paid at the rate of about three per cent a year. Withdrawals may also be made at any postoffice, though occasionally delays are necessary in order to get the sanction of the general officers. Some governments provide a system of accounts subject to check. In 1900 the total deposits in the postal savings banks of England amounted to nearly a billion dollars.

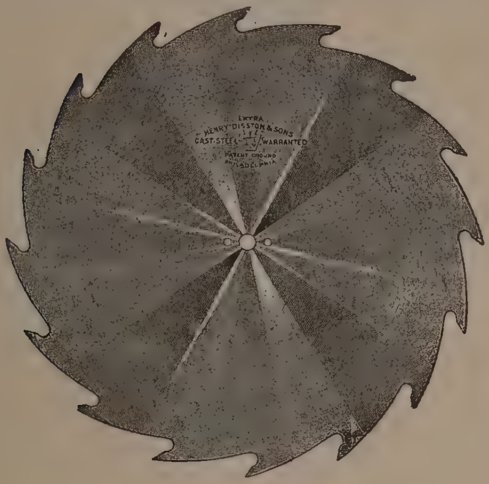
Some foreign cities have within the past century established municipal savings banks, the municipal government being responsible for deposits and in turn encouraging the accumulation of savings among its citizens. Neither of these systems has gained a foothold in the United States, although there is a growing sentiment in favor of the system of postal savings banks.

Savonarola, *sah'vo na ro'la,* Girolamo (1452 1498), an Italian reformer, born at Ferrara. At an early age he entered the convent of the Dominicans at Bologna, where he studied industriously and soon became professor of philosophy and theology. When he was admitted to holy orders he began preaching in Ferrara, but he soon went to Florence, where, in 1491, he was elected prior of the convent of San Marco. Having persuaded himself that he was prophetically inspired, he assumed to foretell impending calamities. He was intensely enthusiastic and earnest in his efforts to reform the morals of the period. Feeling that the Church required purification, he fearlessly assailed Alexander VII, who was then pontiff. In 1494, when Charles VIII invaded Italy, Savonarola went to him and by the religious fervor of his appeal had Florence spared from invasion. He took a prominent part in framing the constitution of the Florentine Republic and opposed the pretensions of the Medici to regain the dominion of Florence, proclaiming death for those who conspired against the Republic. The Medici had a strong influence at the Vatican, and this resulted in the issue of a papal brief, commanding Savonarola to appear in Rome to explain why he represented himself to be inspired by God. He pleaded illness and danger from his enemies for not complying with the papal mandate. According to some authorities Pope Alexander then issued a bull of excommunication against him. Savonarola, however, continued his clerical duties, and, while the plague was raging in Italy, went about among the sufferers and administered the sacraments of the Church to the dying. But it was soon evident that he had somehow lost his hold on the Florentine populace. On April 9, 1498, the convent of San Marco was attacked, and Savonarola and two of his fellow monks were made prisoners. Six weeks after their arrest they were led to execution. In the interval between his condemnation and death, Savonarola devoted himself to prayerful preparation. Savonarola's writings consisted of sermons, theological works and a treatise on the government of Florence.

Savoy', House of, one of the oldest royal houses of Europe, now represented by the king of Italy. Humbert (about 1003–1056) was the first of the family who took a prominent place among the princes of northern Italy. The family dominions continued to increase, and under Amadeus II (1103–1149) were raised to a county of the Empire and given the name of Savoy. Amadeus VII (1383–1391) forced the count of Provence to cede Nice to him, and Amadeus VIII (1391–1451), grandson of the preceding, received the ducal title from the emperor Sigismund and acquired the county of Geneva, together with Bugey and Vercelli. Charles III (1504–1553) aided the emperor Charles V against Francis I of France and was finally deprived of all his territories by the French king, but his son Emmanuel Philibert (1553–1580) succeeded in gaining back the greater part of the paternal domains. Charles Emmanuel I (1580–1630) reconquered the marquisate of Saluzzo, but Henry IV of France invaded Savoy and Piedmont and compelled the duke to give up Bugey, Valromey and Gex. His son, Victor Amadeus I, regained these possessions, and added to them

Montferrat, Alba and some other places. Victor Amadeus II (1675–1732), grandson of the first of that name, at the beginning of the War of the Spanish Succession, sided with France, but afterward transferred his services to Austria. By the Treaty of Utrecht he received a part of the duchy of Milan, along with the island of Sicily, which conferred upon him the title of king; but in 1720 he was compelled to give up Sicily to Austria, in exchange for Sardinia, which, along with Savoy, Piedmont and his other dominions, became the kingdom of Sardinia. See Sardinia, Kingdom of.

Saw, a tool made of a thin band or disk of steel, and used in cutting wood, stone, ivory and metals. One edge of the saw is usually cut into teeth. The shape of the teeth divides saws into two classes, crosscut and rip, and each class has many sizes and shapes. The *crosscut saw* has teeth for cutting across the fiber of the wood. They are triangular and are sharpened on both sides, coming to a sharp point. The teeth of the rip saw have one side vertical to the edge of the saw, and the other sloping. They are sharpened so as to have an edge like a chisel. In all saws the points of the teeth are bent outward, alternately to the left and right, so that the portion of wood, or *kerf*, cut by the saw will be wider than the thickness of the blade. This bending of the teeth is called the *set*. Circular saws are mounted on an arbor moved by machinery. They are found in sawmills and wood-working factories. Band saws are made of thin bands of steel, whose ends are welded together and stretched over pulleys. The band saw runs through a table, upon which the lumber is placed. Such saws are used in making barrel staves and other parts of furniture. Saws used by butchers and machinists have very narrow blades, fixed in iron frames. The teeth are fine, and the blades are tempered until they are very hard.

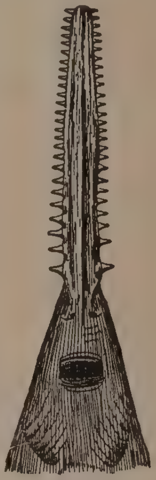


A CIRCULAR SAW
Rip saw used in a machine saw.

The use of the saw requires some care and skill. The ordinary hand saw, the tool of this class in most general use, should be grasped firmly in the right hand, and the piece of wood to be cut should be held firmly against the bench or other support by the left hand. The saw should be placed upon the wood at the mark where it is to be cut and guided by the thumb of the left hand. It should be so held that it will cut through the wood in vertical and horizontal directions, thus forming what the carpenter calls a *square edge*. The first stroke should be backward, and the saw should be used with little pressure.

Saw Fish, a fish nearly related, on the one hand, to the sharks, and on the other, to the rays. It attains a length of seven and a half feet, and has a long beak, or snout, with spines projecting like teeth on both edges. It is very destructive to shoals of small fishes and is said to attack and inflict severe and even mortal injuries on large whales. The mouth on the under surface of the head has rough, flat teeth, used for crushing the food.

Saw Fly, the name of any one of a numerous family of insects who deposit their eggs in holes made by a saw-like apparatus in the stalks or other parts of plants. One egg is placed in each perforation, with a fluid which causes a gall-like swelling, where the larva lives. Different species infest different plants, and the larvae are destructive in different ways; though they practically disappear for several years at a time, they again become very numerous and do much damage to wheat, grain, turnips and other crops.



SAW FISH
Under surface of head of fish.

Saxe, John Godfrey (1816–1887), an American humorous poet. He studied law and practiced for a time, but finally took to journalism and literature. Some of his poems have been very popular in America. They include *Progress*, a satirical poem; *The Money King*; *The Flying Dutchman*; *Clever Stories of Many Nations*; *The Masquerade*; *Fables and Legends*, and *Leisure Day Rhymes*.

Saxe, MAURICE, Count (1696–1750), a marshal of France, natural son of Augustus II, king of Poland. He served in the Russo-Polish army, but made himself unpopular with the Russian government and withdrew to France. At Paris he became thoroughly acquainted with military tactics. On the death of his father he declined the command of the Saxon army, offered him by his brother, Augustus III, and joined the French, with whom he distinguished himself at Ettingen and Philipsburg. In 1744 he was rewarded with the staff of a marshal of France. He was employed in the War of the Austrian Succession, and in 1745 he gained the famous Battle of Fontenoy. In 1747 he was victorious at Laffeld, and in the following year he took Maestricht, soon after which the Peace of Aix-la-Chapelle was concluded. He wrote a treatise entitled *Mes Rêveries*, on the art of war.

Saxifrage, *saks'e fraje*, a popular name of various plants. The species are mostly inhabitants of highland regions of the colder and temperate parts of the northern zone. Most of them are true rock plants, with tufted foliage and panicles of white, yellow or red flowers; and many are well known as ornamental plants in gardens. The genus is a large one, containing upward of 150 species, of which at least 50 are natives of North America. From China comes a saxifrage that is now a common house-plant, known in the United States as the *strawberry*, or *beefsteak*, *geranium*. Other varieties are the *golden saxifrage* and the *swamp saxifrage* of the United States, which have long, tongue-shaped leaves and greenish flowers.

Sax'ons, a Teutonic race that in the third century of the Christian era were numerous, warlike and piratical. In the fifth century considerable hordes of them crossed from the Continent and laid the foundations of the Saxon kingdoms in Britain. Those who remained in Germany (Old Saxons) occupied a great extent of country, of vague and varying limits, which bore the general name of Saxony. Charlemagne waged a thirty years' war against the Saxons until Wittikind, their national hero, with many of his countrymen, submitted to the conqueror and embraced Christianity.

Sax'ony, KINGDOM OF, a kingdom of Germany, and one of the states of the German Empire, bounded on the n. w., n. and e. by Prussia, on the s. e. and s. by Bohemia, on the s. w. by Bavaria and on the w. by Reuss, Saxe-Weimar and Saxe-Altenburg. Its greatest length is 135 mi.; its greatest breadth, 75 mi., and its area, 5787 square miles. For surface, drainage, climate, products and cities, see GERMANY.

The name Saxony was originally given to the country in which the Saxons dwelt. These people were conquered by the Franks in 785 and were completely subjugated within the next twenty years. Later the Saxons and most of their country were incorporated into the empire of Charles the Great. Owing to the attacks by Slavs and Northmen the people organized the country into divisions called *marks*, for the purpose of mutual protection. These were governed by dukes, one of whom, with his descendants, extended his power over the entire region known as Saxony and thus formed the old Saxony duchy. In 919 Henry, the ruler of this duchy, was elected king of Germany and his family ruled the country until 1024. During the Middle Ages the kingdom formed various alliances and was ruled by a number of different families.

At the breaking out of the Reformation the country was ruled by Frederick the Wise, who was an intimate friend of Luther and who used his influence to establish Protestantism in Saxony and other German countries. In this he was measurably successful, and his son and successor continued the work and finally secured the triumph of Protestantism in Germany; but during the Thirty Years' War Saxony lost her position as the leading Protestant German state. Late in the seventeenth century Frederick Augustus, who was at that time emperor, also became king of Poland and joined Peter the Great and the king of Denmark in an attempt to overthrow the government of Sweden. The failure of this attempt was disastrous to Saxony and left the country nearly bankrupt.

In 1735 Saxony became involved in the War of the Austrian Succession, from which it did not escape without financial disaster. In 1806 the ruler, Frederick Augustus I, became an ally of Napoleon, who in the following year conferred upon him the duchy of Warsaw, but after the overthrow of Napoleon at Leipzig Augustus was deprived of more than half of his kingdom, which was awarded by the Congress of Vienna to Prussia. In 1866 Saxony joined Austria in the Seven Weeks' War and as a result was compelled to become a member of the North German Confederation; in 1871 she became a member of the German Empire.

The kingdom is independent in all things pertaining to local affairs, and the government is a constitutional monarchy, the king being assisted by six ministers, at the heads, respectively, of the departments of justice, finance, interior, education, foreign affairs and war. The legislature consists of two chambers, the first composed of princes, nobles, ecclesiastics and burgomasters of the chief cities, together with a few members nominated by the king. The second chamber, or house of representatives, is composed of members elected by indirect suffrage.

Sayre, *sair,* PA., a borough in Bradford co., 59 mi. n. w. of Scranton, on the north branch of the Susquehanna River and on the Lehigh Valley railroad. It is in an agricultural region near the coal fields, and it has a large trade in farm and dairy products. There are lumber and coal yards, railroad shops, stove works and other factories. The municipality has a public library, the Packer Hospital and a high school. It was settled in 1840 and was chartered in 1891. Population in 1900, 5243.

Scab or **Scabies,** *ska'be eez.* See MANGE.

Scab'bard Fish, a beautiful fish, found in the Mediterranean and eastern Atlantic, so called because in shape it bears some resemblance to the sheath of a sword. It is of a bright silvery whiteness, with a single dorsal fin running along the back, and it grows to a length of five or six feet.

Scad or **Horse Mackerel,** a genus of fishes included in the mackerel family and found around the coasts of Great Britain. It is about a foot long and is greenish in color, with silver sides. It appears in large shoals, and the flesh, although coarse, is eaten salted during the winter months.

Scale, in music, a succession of notes arranged in the order of pitch, and comprising those sounds which may occur in a piece of music written in a given key. In its simplest form the scale consists of seven steps or degrees, counted upward in a regular order from a base note (the tonic or keynote), to which series the eighth is added to form the octave. It has been the practice among musicians to consider the scale having C for its keynote as the natural, or normal, scale. The *diatonic scale* ascends by five steps (tones) and two half steps (semitones), taking for the names of the notes the syllables do, re, mi, fa, sol, la, ti, do; the two semitones occur between E and F (mi and fa) and B and C (ti and do). When the scale is graduated all the way by a series of twelve half-steps, or semitones, it is called the *chromatic scale.* A scale is said to be *major* when the interval between the keynote and the third above it, as from C to E, consists of two tones; it is called *minor* when the interval between the keynote and its third, as from A to C, consists of a tone and a half. See MUSIC.

Scale Insect or **Bark Louse,** one of a large number of different species of insects which attach themselves to all parts of plants, where they remain in order to suck the juices. They are very small and cover themselves with scales, which are either naked or covered with cottony down or hair. Some species are serious pests and affect not only choice garden and hothouse plants, but also the fruit-bearing trees and shrubs. Many different methods of treatment are advised, some of which are quite successful. An emulsion of kerosene or crude petroleum will usually control the pest when the insects are young. See LAC.

Scales, the plates that grow from the skin of certain animals, especially the fishes. The scales overlap one another like the shingles on a roof and form a defensive armor. Some animals, like the scaly ant eater, and some serpents are also protected in this way. The scales consist usually of a horny substance, occasionally containing some lime, and varying in shape, size and arrangement according to the genus of the animal. In botany, the word *scale* is applied to small, bracted leaves which are scale-like in form, whose function seems to be that of protecting the more delicate plant organs. A common instance is found in the scales which protect the leaf buds during the winter.

Scallop, *skol'lup,* the common name of a genus of mollusks related to the oysters. There are numerous species, of which the common and great scallop are the most familiar forms. The latter is esteemed a delicacy in the markets of London. It was a shell of this species that in the Middle Ages was carried in the hats of pilgrims, as a sign that they had visited the Holy Land. The shell is somewhat rounded and ends in a triangular ear, in which the hinge is placed.

Scalp, THE, the outer covering of the top and back part of the skull. It consists of the skin, which, with the exception of the growth of hair, differs little from ordinary skin; the tendon of the muscle that wrinkles the forehead horizontally and moves the scalp; cellular tissue, and blood vessels. Injuries to the scalp, especially severe burns, often result in erysipelas and inflammation. The word *scalp* is also applied to the circular piece, about four inches in diameter, taken by the indian from the crown of the head of his victim. In 1755 Massachusetts offered £20 for the scalp of an indian woman or child and £40 for that of a male. During the Modoc War in 1873 scalps were taken by the troops.

Scam'mony, a plant which grows in abundance through Syria and Asia Minor. It is larger than the common bindweed, but resembles it decidedly and has a stout tap root, from which a common drug is taken. Scammony is blackish-gray, with a nauseous smell and a sharp, bitter taste, and is given in medicine where a strong cathartic is needed.

SCAMMONY

Scan'derbeg, Alexander, Prince (1404–about 1467), a patriot of Albania, whose real name was George Castriota. He was entrusted to the Turks as a hostage and was brought up at the Turkish court in the Mohammedan faith. At the age of eighteen he was placed at the head of a body of Turkish troops, but on hearing of the death of his father he renounced Mohammedanism, fled to Albania and there raised the standard of insurrection. He repeatedly defeated the Ottoman forces, and Mohammed II found it necessary to accept terms of peace. After his death Albania again fell under Turkish dominion.

Scan'dina'via, the name formerly applied to the kingdoms of Norway, Sweden and Denmark or of Norway and Sweden alone, and still frequently used in referring to these countries. It is also the name of the peninsula containing Norway and Sweden. The term now has no political significance. See Denmark; Norway; Sweden.

Scapegoat, in the Jewish ritual, a goat which was brought to the door of the tabernacle, where the high priest laid his hands upon him, confessing the sins of the people and putting them on the head of the goat. The goat was then sent into the wilderness, bearing the iniquities of the people.

Scap'ula. See Skeleton.

Scar'ab, a beetle, sometimes called *dung-beetle*, from its habit of enclosing its eggs in pellets of dung, which are placed in holes excavated for their reception. The sacred beetle of the Egyptians was regarded with great veneration, and figures of it, plain or inscribed with characters, were habitually worn as amulets. Large numbers of these scarabs, made of hard stone or gems, are still found in Egypt, from which many thousands have been taken. Some of the carved scarabs are three or four feet long.

SCARABS

Scarlet Fever, a very contagious disease that is often fatal and that frequently leaves serious disorders of the system in its train. It begins with something like an ordinary cold, with sore throat, which is, however, followed by a high fever and scarlet eruptions on the body. One variety of the disease is very light, while another is more severe, and in a third form the symptoms increase in violence with great rapidity, and the disease proves fatal within two or three days. In a majority of cases the fever begins to fall after the fifth day, and the recovery thereafter is gradual. Not infrequently death occurs as a result of complications, rather than of the disease itself. Dangerous diseases of the kidneys supervene, and inflammations which may result in deafness and in loss of the power of speech, as well, form often in the throat or in the inner ear. The appearance of kidney complications is usually noticed in that stage of the disease during which the flakes of skin are peeling off, and at this time dropsy is frequent.

A person suffering from scarlet fever is peculiarly liable to the infection of bacterial diseases, and pneumonia and diphtheria frequently follow. Scarlet fever is not strictly a disease of childhood, though comparatively few adults have it. From its seriousness it is evident that each case should be carefully treated and that the patient should also be guarded against cold or infection from any other disease throughout his convalescence. From its peculiar contagiousness, it is evident that each case should be carefully isolated and that thorough disinfection should follow recovery. The germs have been known to remain active in clothing and elsewhere for a long time. It should be remembered, too, that the contagion is active during that stage of the disease when the body is shedding the poisonous scales. The child should be kept away from others for six or eight weeks, in order that it may be certain that he is not a source of infection.

Scarron, *ska rohN′*, PAUL (1610–1660), a French burlesque writer, born at Paris. He was educated for the Church, but his youth was most dissipated. About 1638 he was seized with paralysis, which deprived him of the use of his legs. He maintained himself, however, by working for the booksellers and, having risen to fame for his talent at burlesque, he entertained at his house the brilliant literary society of Paris. In 1652 he married Françoise D'Aubigné, a young girl of great beauty, afterward the famous Madame de Maintenon. Of Scarron's numerous writings the best is the *Comic Romance*, the tale of a band of strolling actors.

Schadow, *shah′do*, JOHANN GOTTFRIED (1764–1850), a noted German sculptor, born at Berlin. At an early age he studied drawing and sculpture in his native city and later went to Italy, where he worked in the museum of the Vatican and of the Capitol and made a close study of the antique sculptures. He was influenced by the works of Giovanni da Bologna and Michelangelo. On his return to Berlin, in 1788, he was appointed court sculptor. His first great work was the monument erected in the Dorothea Church, Berlin, to the memory of the count of the mark, and this was followed by the colossal statue of Ziethen, the statue of Frederick the Great in Stettin, of Leopold of Dessau in Berlin, of Blücher in Rostock, the Tauenzein monument in Breslau, the statue of Luther in Wittenberg, *Mars* and *Quadriga of Victory*, besides innumerable portrait busts of eminent personages.

Schaffhausen, *shaf how′zen*, a city of Switzerland, capital of a canton of the same name, situated on the right bank of the Rhine, 23 mi. n. by e. of Zurich. The city is of interest because of its ancient buildings, which represent a peculiar style of architecture. It also retains some of the ancient walls and defenses. Among these is a part of a castle, which dates from the sixteenth century, and a rounded tower 115 feet in diameter. Among the buildings of interest are the cathedral, dating from the eleventh century, the townhall and the museum. The manufactures include woolen goods, watches and pottery. Near by are the Falls of Schaffhausen, a cataract of the Rhine which has a descent of about 100 feet. Population in 1900, 15,403.

Scheldt, *skelt*, an important river of Belgium and the Netherlands. It rises in the French Department of Aisne and flows north and then northeast through Belgium. At Antwerp it has a breadth of about 1600 feet and forms a large and secure harbor. About 15 miles below Antwerp it divides into the East Scheldt and the West Scheldt, forming a double estuary and enclosing the islands of South Beveland, North Beveland and Walcheren. Its length is 200 miles, and in the lower part of its course its banks are strengthened by dikes. The Scheldt is navigable for nearly its entire length and is connected by canals with the chief cities of Belgium and France. It is one of the most important commercial waterways of Europe.

Schelling, *shel′ling*, FRIEDRICH WILHELM JOSEPH VON (1775–1854), a German philosopher, born at Leonberg, Württemberg. He was educated at Tübingen and Leipzig, and then became a professor in the University of Jena. His system of philosophy rests upon the idea of an infinite self, whose will is everywhere expressed in human activity. He advanced the theory that this universal self, or spirit, manifests itself not only in the soul, but also in nature or the world of sense. According to his belief the various phenomena, or objects of nature, are simply thoughts of this one spirit, but it is in man alone that the spirit's thoughts become self-conscious, and because of this man is the highest development in nature. Schelling's system was never completely developed.

Schenectady, *ske nek′ta dy*, N. Y., the county-seat of Schenectady co., 17 mi. n. w. of Albany, on the Mohawk River, on the Erie Canal and on the New York Central and the Delaware & Hudson railroads. It is an important industrial city, producing electrical supplies, locomotives, foundry and machine shop products, brooms, brushes, medicines and other goods. Union College is located here. Some of the other prominent buildings are the courthouse, the city hall, the opera house, the Y. M. C. A., a public library, the high school and the Ellis Hospital. There are more than a score of churches, two national banks, gas and electric lights and an electric street railway. Schenectady was settled by Arent Van Corlear in 1662. The French and indians massacred most of the inhabitants in 1690 and burned a part of the settlement. It was incorporated as a borough in 1765 and was chartered as a city in 1798. A large part of the business section was destroyed by fire in 1819. Population in 1905, 58,387.

Schenk, *shenk,* Robert Cumming (1809–1890), an American soldier and politician, born at Franklin, Ohio, and educated at Miami University. He was admitted to the bar in 1831 and took an active interest in politics. He was appointed minister to Brazil by President Fillmore, serving from 1851 to 1853. At the outbreak of the Civil War he became a brigadier general of volunteers, took a part in the early West Virginia campaign and at the second Battle of Bull Run distinguished himself for bravery. He was made major general of volunteers, but resigned in 1863 to enter Congress, where he served until 1870. In the following year he was a member of the commission to draw up the Treaty of Washington. In the same year he was appointed minister to England, where he remained until 1876.

JOHANN FRIEDRICH VON SCHILLER

Schiller, *shil'lur,* Johann Friedrich Christoph von (1759–1805), one of the greatest of German dramatists and poets, born at Marbach, Württemberg. His father was superintendent of the woods and gardens attached to a residence of the duke of Württemberg, and the duke had the boy educated in a military academy, which he himself had founded at the castle of Solitude. Here Schiller studied jurisprudence; but when the school was removed to Stuttgart, and its scope became extended, he turned his attention to medicine. In 1780 he was appointed physician to a regiment in Stuttgart, and it was now for the first time that he had enough leisure and freedom to finish his tragedy of *The Robbers,* begun three years previously. He published this piece at his own expense in 1781; it attracted an immense amount of attention, and in 1782 it was performed at Mannheim. Arrested for attending the performance without leave of the duke of Württemberg, and forbidden by the same despotic authority to write plays, Schiller fled from Stuttgart and settled at Mannheim, as poet to the theater. Here the plays of *Fiesco* and *Cabal and Love* were soon after produced.

In 1785 he went to Leipzig and Dresden, where he studied the history of the times of Philip II, thus preparing himself not only to write his drama of *Don Carlos,* which appeared in 1787, but also to publish a *History of the Revolt of the Netherlands.* Visiting Weimar in 1787, he received a friendly welcome from Wieland and Herder, and later he made the acquaintance of Goethe, with whom he formed a close friendship. Goethe secured for him a professorship at Jena, and here he lectured on history and published *Historical Memoirs from the Twelfth Century to the Most Recent Times* and his *History of the Thirty Years' War.* It was then, also, that, through the influence of Goethe, he returned with renewed ardor to poetry and produced his finest lyrical poems and ballads. Among these are *The Diver, The Cranes of Ibycus, The Glove* and *The Song of the Bell,* the finest of German lyrics. It was after 1798 that he published in succession the dramas of *Wallenstein, Maria Stuart,* the *Maid of Orleans,* the *Bride of Messina* and *William Tell,* this last his greatest work. He also adapted Shakespeare's *Macbeth* for the stage. In 1802 he was raised to the rank of nobility. In German literature Schiller stands second only to Goethe, and his works are perhaps read more than those of Goethe.

Schilling, *shil'ling,* Johann (1828–), a German sculptor, born at Mittweida, Saxony. He studied art at Berlin and Dresden and later at Rome. In 1868 he became professor at the Dresden Royal Academy. His chief works include the *Four Seasons,* at Dresden; Schiller's statue, at Vienna; Maximilian's statue, at Triest; *War Memorial,* at Hamburg, and the *German*

National Monument, on the Niederwald, opposite Bingen on the Rhine, with a colossal figure of *Germania.*

Schleswig-Holstein, *shlais'viK hole'stine,* a province of Prussia, bounded on the n. by Denmark; on the e. by the Baltic Sea, Lübeck and Mecklenburg-Schwerin; on the s. by Hamburg and Hanover, and on the w. by the North Sea. Its area is about 7340 square miles, or a little less than that of New Jersey. Schleswig is the northern part and Holstein is the southern part of the province. Schleswig-Holstein forms a part of the same peninsula with Jutland, to which, in its general character, it bears considerable resemblance. There are extensive moorlands; the west coast consists of sandy and marshy flats, protected in Schleswig by chains of hills and in Holstein by lofty dikes. The east coast is scooped out into natural harbors. The principal streams flow to the west, toward which for the most part the country slopes.

In the tenth century and the early part of the eleventh century, Schleswig formed part of Germany, but in 1027 it was ceded to Canute of Denmark. In the thirteenth century it was made a duchy, under the control of Denmark, and late in the fourteenth century it came under the control of the count of Holstein. When in 1460, on the extinction of the Holstein dynasty, Schleswig-Holstein chose Christian I of Denmark as ruler, provision was made that they should never be separated from each other or incorporated with Denmark. Although thus closely united, the two duchies differed widely from each other, Holstein being almost completely German, and Schleswig, Danish.

A proclamation of the Danish king, issued in 1848, that Schleswig was to be incorporated with Denmark, brought on a rebellion throughout Schleswig-Holstein, which was aided by Prussia and other German states. Denmark was defeated, and in the following year, when she entered on hostilities again, she was a second time driven from Schleswig. In 1851, however, Prussia and Austria again entered the struggle, this time on the side of Denmark, and the result was the suppression of all revolt.

Bismarck in 1864 induced Austria to join with Prussia in an attempt to compel Denmark to withdraw Danish rule from Schleswig-Holstein, and when Denmark refused, open war began. The result was the defeat of the Danes and the cession of Schleswig and Holstein to Austria and Prussia. By a treaty between these two nations, Schleswig was placed under the control of Prussia, while Austria regulated affairs in Holstein. As Bismarck had expected, the differences between Austria and Prussia over the management of the duchies led, in 1866, to war (See SEVEN WEEKS' WAR), the outcome of which was the union of Schleswig-Holstein with Prussia.

Schley, *shlay,* WINFIELD SCOTT (1839–), an American naval officer, born in Frederick County, Md. He entered the United States Naval Academy at the age of seventeen and graduated in 1860. In the same year he served on the *Niagara,* which was sent on a cruise to China and Japan. He won a lieutenancy in 1862 and later received other promotions, but he did not especially distinguish himself until his discovery of Lieutenant Greely in the far north. Greely had gone north with his expedition in 1881 and had not been heard from for two years. Commander Schley volunteered his services as head of the relief expedition which set sail in 1884, found Greely and six of his followers and brought them back. In the war with Spain he was attached to Sampson's command and was in temporary charge of the fleet on July 3, 1898, when Admiral Cervera's fleet came out of Santiago harbor and was destroyed.

After the close of the war a number of statements derogatory to Admiral Schley's conduct during the war were made by officers of the navy, and the publication of Maclay's *History of the American Navy,* in which he was accused of cowardice, led him to request the secretary of the navy to have these charges investigated. In accordance with this request a court of inquiry consisting of Admiral Dewey as president and rear admirals Benham and Ramsey was called to meet in Washington in September, 1901. The court rendered its decision on December 13. The conduct of Schley in the battle with Cervera's fleet was commended, but his management of what was known as the flying squadron previous to this battle was censured. Admiral Schley appealed from the decision, first to the secretary of the navy, and finally to the president, but both sustained the verdict of the court.

Schliemann, *shle'man,* HEINRICH (1822–1890), a German archaeologist. He traveled widely and acquired many languages, and having made a fortune, he commenced a series of archaeological investigations in the East. In 1870 he began excavations in the Troad, on the hill of Hisslarik, believing that there he would find the site of ancient Troy. He continued his investigations for twelve years, and then Dr. Dörpfeld took them up. In 1875 Schliemann commenced excavations at Athens and Mycenae, and in 1877 he discovered the five royal tombs which local tradition in the time of Pausanias asserted to be those of Agamemnon and his companions. Many treasures of gold and silver were brought to light, but the chief result of his investigations was the great increase in knowledge concerning the early civilization of the Greeks. His publications include *Ithaca, the Peloponnesus and Troy*; *Trojan Antiquities*, and *Mycenae*.

Schmalkaldic, *shmal kahl′dik,* **League,** a league entered into at Schmalkalden in 1531, by several Protestant princes and free cities, for the common defense of their faith and political independence against the emperor, Charles V. Among the organizers were the elector of Saxony; his son, John Frederick, and Philip of Hesse. The rulers of Saxony were empowered to manage its affairs. In the war of the Schmalkaldic League against Charles V (1546–1547), Charles was at first sucessful. In his victories he was aided by Maurice of Saxony, who had been a member of the Schmalkaldic League, but who, tempted by the promise of the electorate of Saxony, had gone over to the side of the emperor. At Mühlberg (1547), the Protestant forces were totally routed, and both the elector and Philip of Hesse fell captive to the emperor. At this juncture, however, Maurice deserted the emperor and, returning to his former allegiance, organized a revolt. Making an alliance with Henry II of France, he led the League again into the field and by several successive victories forced the emperor to grant the Treaty of Passau, guaranteeing absolute freedom of worship to the Protestants. See REFORMATION, THE.

Schnorr von Karolsfeld, *shnor fon kah′rols felt,* JULIUS (1794–1872), a German painter, born at Leipzig. From 1817 to 1827 he resided in Italy, where with Overbeck and others he formed the Pre-Raphaelite school, and he was then invited by Ludwig, king of Bavaria, to Munich, where he became professor of historical painting in the Academy of Fine Arts. His frescoes in illustration of the Niebelungenlied and of the lives of Charlemagne, Frederick Barbarossa and Rudolph of Hapsburg, at Munich, are among the most famous of modern works of their class. While at Dresden he completed his *Illustrations of the Bible,* which were engraved and published under the title of *Die Bibel in Bildern* (The Bible in Pictures)

Schofield, *sko′feeld,* JOHN MCALLISTER (1831-1906), an American soldier, born in Chautauqua County, N. Y. In 1853 he graduated at West Point, and at the opening of the Civil War entered the service as major of the First Missouri Volunteers. Later in the year he was appointed brigadier general, and afterward he was in command of the Missouri militia. He rendered the greatest service to the Union by his part in Sherman's Georgia campaign and in the Battle of Franklin. In 1868 he was appointed secretary of war to succeed Edwin M. Stanton, in 1869 was made major general of the United States Army and later was appointed general in chief. He was made lieutenant general by President Cleveland in 1895, but retired the same year.

Scholasticism, *sko las′ti siz′m,* a system of philosophy taught by the philosophers of the Middle Ages, who were called Scholastics, or Schoolmen, because their philosophy originated in schools established by Charlemagne and others for the education of the clergy. Scholasticism attempted to harmonize the tenets of the Church with the logic of Aristotle.

Schoolcraft, *skool′kraft,* HENRY ROWE (1793–1864), an ethnologist and geologist, born in Watervliet, New York. He was educated at Union and Middlebury colleges, and in 1816 he commenced an unfinished serial work on glass making, entitled *Vitreology*. He made a journey to the West, with the object of extending his knowledge of geology and mineralogy, and on his return he published *A View of the Lead Mines of Missouri*. In 1820 he was appointed geologist to the expedition dispatched by the government to explore the sources of the Mississippi, and two years later he was appointed agent for indian affairs in the northwestern provinces, devoting himself to the investigation of the languages, ethnology and antiquities of the indians. In 1832 he conducted a government expedition to the Upper Mississippi, and he explored the sources of that river. He negotiated the purchase by the government of 16,000,000 acres in this region, and was appointed acting superintendent of indian affairs for the northern department. Among his chief works are *Historical and Statistical Information Respecting the History, Condition and Prospects of the Indian Tribes of the United States* and *Thirty Years with the Indian Tribes of the Northwestern Frontier*.

School Garden. See GARDENING.

Schoolmen. See PEDAGOGICS; subhead, *Schoolmen*.